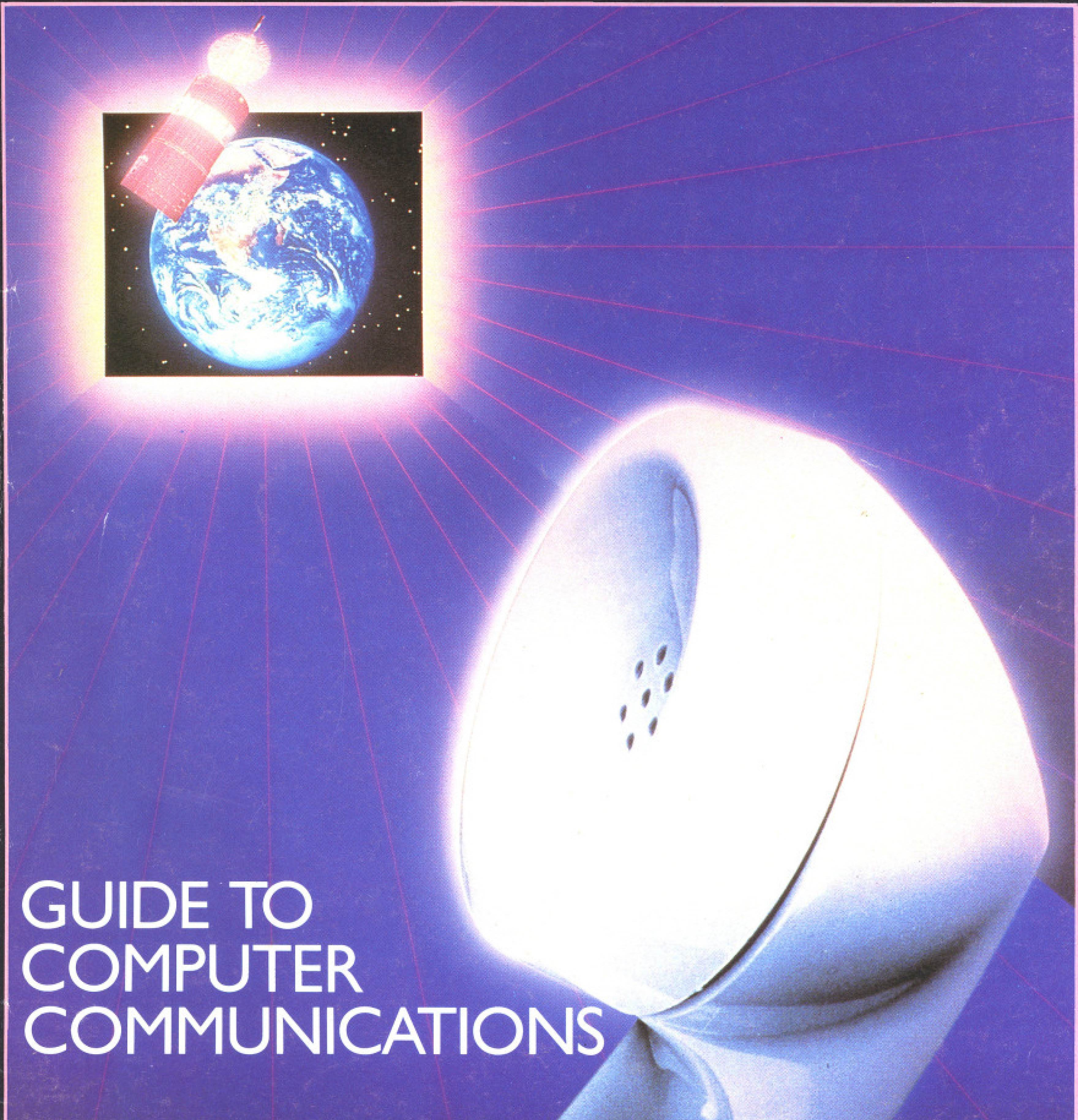
YOUR

COMMODORE

AN ARGUS SPECIALIST PUBLICATION

OCTOBER 1987 £1.10



GUIDE TO COMPUTER COMMUNICATIONS

- BOTHERSOME BASIC – BEGINNERS START HERE
- REBOUND – SUPERB C16, PLUS/4 GAME
- ADVENTURE KIT-DIY ADVENTURING

CONTENTS

VOLUME 4 NUMBER 1

FEATURES

REGULARS



Star Paws

GAMES AND UTILITIES

DATA STATEMENTS

Electronic Arts in the UK

Electronic Arts, one of the top US entertainment software companies have announced their plans to launch a U.K. subsidiary, and are looking for new talent. 'We are looking to support U.K. software artists designing high quality software', comments Mark Lewis, Director of European publishing. 'We are in discussions with a number of software developers and are happy to talk to those who believe they can offer creativity and quality programming.'

Touchline:
Electronic Arts Ltd: *Langley Business Centre, 11-49 Station Road, Langley, Nr. Slough, Berkshire SL3 8YN.* ***Tel:*** *0753 49442.*

What Book to Buy

Following the success of the 'What' range of computer books, H & D Services have decided to go national with their second volume. A major factor in the marketing of the books is that they will be sold only through independent retailers. This provides a natural link with United Software Distribution Ltd (U.S.D.) who will be presenting the book to major independent computer retailers in the U.K.

U.S.D.'s Managing Director Andy Wood commented, 'these publications help the consumers gain more understanding of the software that they buy. The books also prolong the longevity of software and they help solve some of the queries that haunt consumers, retailers and software houses alike.'

The 'What' range are available only from computer retailers and include 'What Now?' which is a handbook for adventurers, packed with hints, maps and solutions. Also 'What Poke' which comprises hints, maps and pokes for arcade type games.

Touchline:
H & D Services: *1338 Ashton Old Road, Higher Openshaw, Manchester M11 1JG.* ***Tel:*** *061-370 5666.*

Shades for 'Free'

All Micronet members are now eligible for five hours free play on *Shades* – the multi-user adventure game. Shadists (as Shades players like to be known!) can use their five hours anyway they want – in one block of five hours for one person or spread out in smaller blocks. The offer stands for all Micronet members regardless of whether they've played before or not.

Touchline:
Micronet: *Telemap Ltd, Durrant House, 8 Herbal Hill, London EC1R 5EJ.* ***Tel:*** *01-278 3143.*



Computer MIDI in Action at Show

One of the big crowd pullers at the forthcoming PCW show will probably be Electromusic Research (EMR) with their live computer-controlled music demonstration. EMR's range of computer MIDI software and hardware covers most home and business 8/16/32-bit micros and new recording, sampling and scorewriting products will be on display. The special offers will include an EMR recording system which connects MIDI-keyboard and computer, for £69.

So follow the sound of music, and you're assured of an entertaining time, not to mention the odd bargain or two.

Touchline:
Electromusic Research (EMR) Ltd: *14 Mount Close, Wickford, Sussex SS11 8HG.* ***Tel:*** *0702 335747.*

New Labels

Go! is a new high profile and performance software brand from U.S. Gold which claims to release six major software products between now and December. Although Go! products will dovetail into certain sales, marketing and distribution policies of U.S. Gold, they will operate in the main as a separate company in terms of advertising activities and European distribution.

DATA STATEMENTS

Go! hope to link up with Captain America of Marvel Comics and Lazer Tag from Worlds of Wonder, the best selling toy in the United States. Also in production is the home computer version of the blockbusting Masters of the Universe film.

U.S. Gold's Tim Chaney believes in the success of Go! and comments 'we are very confident that three years experience as brand leaders in the European software marketplace puts us in the pole position to successfully launch a new brand.'

Following the success of *Barbarian*, Palace have now launched a new software label – Outlaw Productions. Mathew Tims, previously general manager of Palace Software, will head the new operation, which will run alongside Palace. Mathew comments 'there are now a number of highly skilled and professional development teams in existence. Our aim is to help them produce their best work and to market it using the skills and knowledge we have picked up over the last three years.'

The first release on the new label will be a *Shoot 'em Up Construction Kit* for the C64. It has been developed by Jonathan Hare and Christopher Yates of Sensible Software, who with their understanding of the C64 have developed a system, which will enable a person with no programming knowledge to write the sort of games that would have cost £10.



From left: Jonathon Hare, Matthew Tims and Christopher Yates.

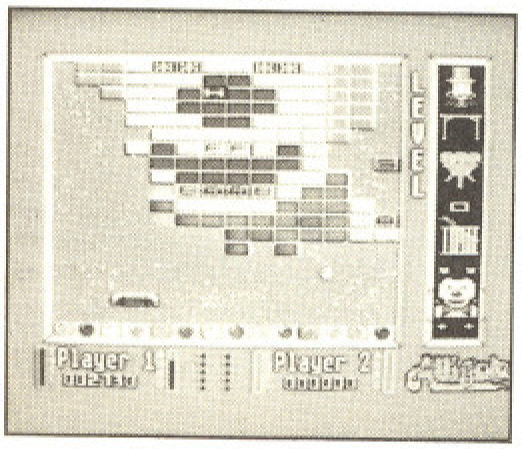
Touchline:

Go! Ltd: *Unit 2/3 Holford Way, Birmingham B6 7AX.* ***Tel:*** *021-356 3388.*

Palace Software Ltd: *275 Pentonville Road, London N1 9NL.* ***Tel:*** *01-278 0751.*

Arcade Action

Alligata Software have released *Addictaball*, a game for the C64 priced at £6.95 on disk. An addictive game of shooting, scrolling protecting, planning and humour, which demands razor sharp reflexes.



Gremlin are in the final stages of completing *Coconut Capers*, which will feature the formidable Jack the Nipper. The game is set in the jungle where the tranquility is broken by the arrival of Jack, who jumps from a plane using his nappy as a parachute. His father however is in hot pursuit, and Jack being Jack gets up to mischief with a tropical flavour in his efforts to avoid being caught and given a spanking. Jack discovers the cocounts are a useful form of defence against the natives and true to form tries to be as naughty as possible. A special surprise awaits Jack as he reaches 100% on the Naughtyometer, but only playing the game will reveal it!

Coconut Capers will be available for £14.99 on disk for the Commodore.

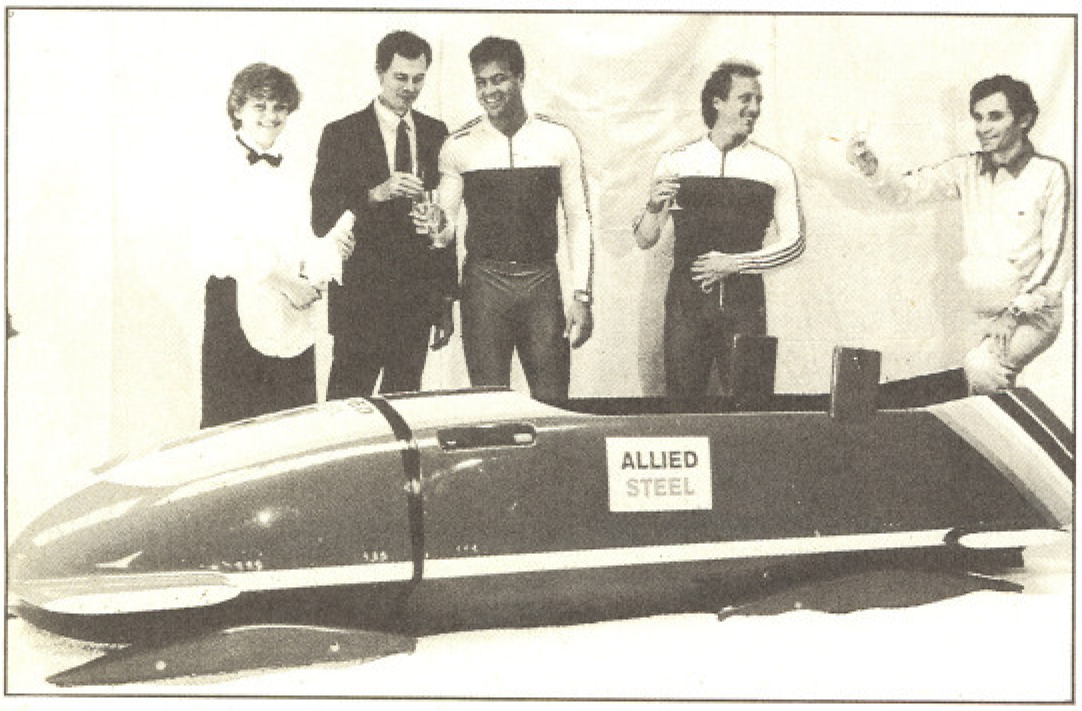
Rebel is the latest 'Gang of Five' game from Virgin. You play worker THX 2240, forced to work in an agriculture factory of the future. However, you can take no more and steal a tank from the Crowd Control Vehicle armoury. Then you must escape by diverting the solar energy normally used to enhance crop growth. You need to collect and arrange solar reflectors to reflect the beam and blast your way through the levels and make your final escape. *Rebel* is available on cassette for C64/128 and costs £9.95.

Digital Integration will be launching three new titles this autumn. *F-16 Combat Pilot* is a game which involves using a complex payload of avionics to search, locate and destroy targets. Control a variety of modern weaponry including AIM sidewinder and AMRAAN missiles, AGM Maverick, laser guided bombs and 30mm cannon to survive and win.



The *ATF* (advanced tactical fighter) portrays the low-flying and virtually undectable Lockhead YF-22A. Pick up intelligence information, chose a variety of targets and test your mind and dexterity in a hostile world.

With *Bobsleigh*, choose your equipment and back-up support



within constraints of sponsorship funds, and get the true feeling of speed as you compete on World Cup and Olympic tracks. All games are available for the C64.

Touchline:
Alligata Software Ltd: *1 Orange Street, Sheffield S1 4DW.* ***Tel:*** *0742 755796.*
Gremlin: *Alpha House, 10 Carver Street, Sheffield S1 4PS.* ***Tel:*** *0742 753423.*
Virgin: *2-4 Vernon Yard, Portobello Road, London W11 2DX.* ***Tel:*** *01-727 8070.*
Digital Integration Ltd: *Watchmoor Trade Centre, Watchmore Road, Camberley, Surrey CU15 3AE.* ***Tel:*** *0276 684044/684959.*

Hardware Update

Now is the time for registered Commodore users to buy a colour monitor for their Amiga. Commodore Business Machines (UK) Ltd are offering £100 off either the Amiga 500 or A1081 colour monitor and £200 off the pair, through vouchers which have been mailed to all registered Commodore users. Commodore dealers have also been notified and a window sticker will signify their participation. There's no time to waste – the offer closes on September 12th.

An upgraded version of the Excelerator disk drive is now available for the C64 from Evesham Micros, who believe it is now the most compatible disk drive on the market. It is selling for £159 and following early production difficulties, it is now fully available from the foreign manufacturers.

The effects of exposure to noise in a computerised environment are often underestimated, and printers in particular should be acoustically shielded to minimise sound levels. Kareware have recently produced a Soundshield, which is aimed at the dot matrix or compact display wheel printer, which can reduce noise levels by 15 decibels. The unit is lined with fire resistant foam and features a tinted reinforced glass lid. The price ranges from £89.50 to £109.50, with additional options available such as a sheet-feeder attachment and stand and a plug-in fan.

In addition to the Amiga 500, C128 and C64, Commodore's distributors



The upgraded Excellerator disk drive.

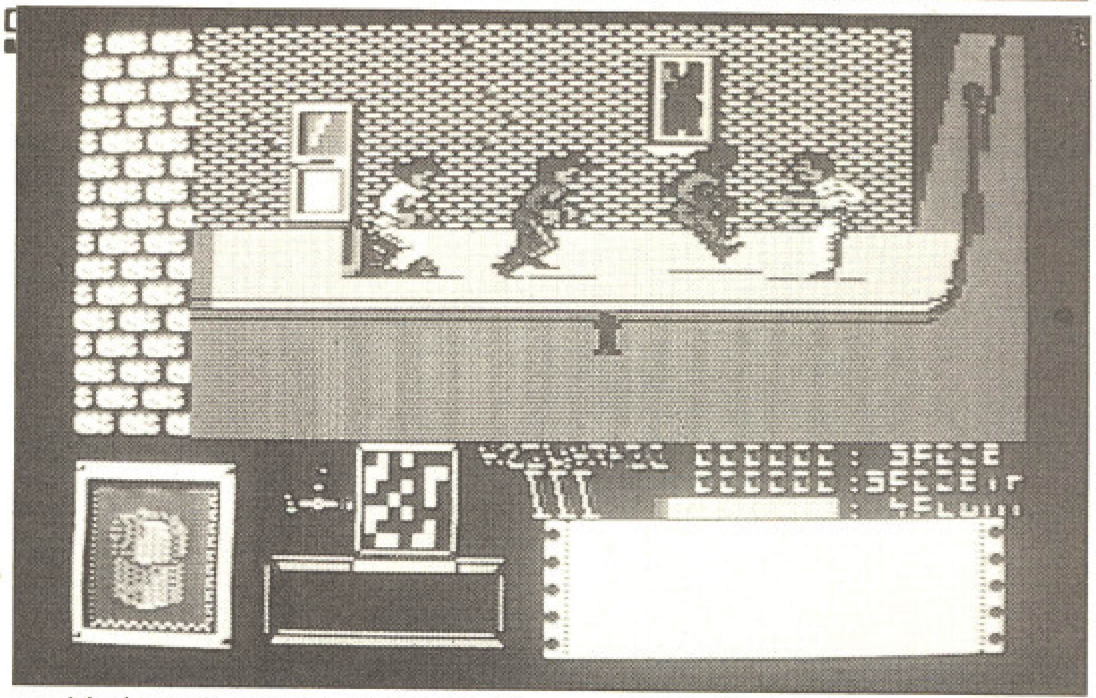
have now been given control over the PC10, PC20 and PC40/20. The distributors are Tomorrow's World in Belfast and Dublin, Lightning Distribution in London, Hugh Symmons in Bournemouth and ZCL (Zappo) Holdings in Staffordshire. The new prices for complete systems with a mono monitor are £699 for the PC10, £999 for the PC20 and £1599 for the PC 40/20. Tom Hart, Commodore's (UK) national sales manager believes that 'the move into the consumer marketplace with those quality engineered products dramatically strengthens the range of Commodore products available to the consumer.'

Following successful sales, Star Micronics U.K. Ltd have cut prices of their two most popular dot-matrix printers. The price of the NL-10 which is a nine-pin printer, offering 12 characters per second (cps) in draft mode and 30 cps in near letter quality, has dropped by over ten per cent and is now available for £248 (which includes parallel interface). At the other end of the scale, the NB-15 which provides an incredible 300 cps in draft output and laser-like letter printing at 100 cps, has dropped in price to £849.

In a bid to provide a compact and effective solution to desk-top printing requirements, Viglen have produced a range of printer stands, at prices ranging from £9.95 to £29.95. The stands are ideal for use with most 80 or 136 column PC printers and allow for up to 1,000 sheets of continuous stationery to be stored underneath.

Touchline:
Commodore Business Machines (UK) Ltd: *Commodore House, The Switchback, Gardner Road, Maidenhead, Berks SL6 7XA.* ***Tel:*** *0628 770088.*
Evesham Micros: *63 Bridge Street, Evesham, Worcs WR11 4SF.* ***Tel:*** *0386 41989.*
KAI Computer Services Ltd Kareware: *Unit 1, 7 Cubitt Street, London WC1.* ***Tel:*** *01-608 0081.*
Viglen: *Unit 7, Trumpers Way, Hanwell, London W7 2QA.* ***Tel:*** *01-843 9903.*
Star Micronics UK Ltd: *Cravern House, 40 Uxbridge Road, Ealing London W5 2BS.* ***Tel:*** *01-840 1800.*

D A T A



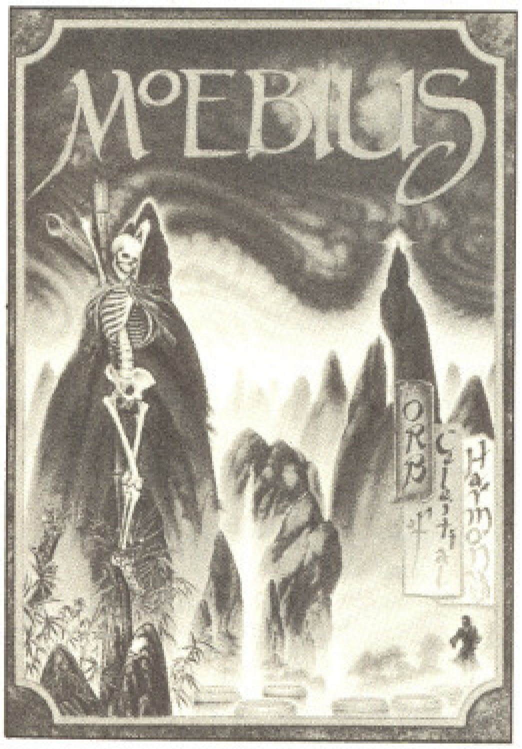
Fight to Win

Gremlin have released a war game which puts the responsibility of the future of the country in your hands. What a position to be in! In *Convoy Raider*, war has been declared and the enemy is closing in and your mission is to patrol and defend the inner sea using all modern weapon systems which includes the Seawolf – a deadly accurate missile, the Exocet, a video-linked rocket and an anti-submarine helicopter. *Convoy Raider* will be available for the C64/128 on disk at £14.99.

Touchline:
Gremlin: *Alpha House, 10 Carver Street, Sheffield S1 4FS.* ***Tel:*** *0742 753423.*

Adventure Time

The MicroProse/Origin partnership have come up with a new concept in fantasy role-playing in *Moebius*. Available on the C64 disk and priced at £19.95, it comes complete with manual and oriental headband.



The aim of the game is to retrieve the Celestial Orb or Harmony which has been stolen from Moebius. The game play is set in four different planes – each having different variables and ever-changing obstacles to overcome. At each level challenges increase, demanding greater courage and cunning, use of martial arts, swordsmanship and the wise use of sophisticated magic systems is essential to overcome an array of opponents ranging from tigers to assassins.

Gremlin have snapped up the computer software rights to the Charles Bronson film, Death Wish and have been busy adapting the film to the small screen to create *Death Wish III.* Available on the Commodore 64/128, the adventure follows the fortunes of Paul Kersey (Charles Bronson) as the justice-fighter who's out to rid New York of the punks and creeps who infect the streets. Kerseys weapons include a 475 Wildey Magnum, a pump action shotgun, a machine gun and a rocket launcher. His greatest ally is his belief that the face of decent New York citizens is in his hands alone; the driving force behind all the violence and bloodshed is Kersey's Death Wish.

Meet *Captain Courageous* – the latest recruit from English Software. Follow his adventures through hair-raising jungle combat, journeys up treacherous rivers, dangerous descents and lethal rockfalls, quick-fire snipper attacks, dramatic gun-fights across high level bridges and the final rescue bid and helicopter snatch. *Captain Courageous* is available on the Commodore 64/128 at £8.95 for cassette and £12.95 on disk.

Touchline:
Microprose Software Ltd: 2 Market Place, Tetbury, Gloucestershire GL8 8DA. ***Tel:*** 0666 54326.
Gremlin: *Alpha House, 10 Carver Street, Sheffield S1 4FS.* ***Tel:*** *0742 753423.*
English Software: *1 North Parade, Parsonage Gardens, Manchester M3 2NH.* ***Tel:*** *061-835 1358.*

The PCW Show is in Town

The Personal Computer World Show is with us once more, and after ten years is still the industry's most comprehensive exhibition for business. This year's show which is being held at Olympia is being run from Wednesday 23rd to Sunday 27th September, and as in previous years the first two days will be reserved for trade and business visitors. The show will open from 10am until 7pm, except on Sunday when it will close at 5pm.

Greater emphasis will be focused on the business visitor this year and the business hall in Olympia Two will boast industry experts in addition to some major product and company launches.

Other attractions will include a desktop publishing stand (DTP) which will give visitors the chance to see how copies of the Daily Show News are produced. The editorial staff will also be at hand to offer advice and opinions of the fast growing DTP industry.

The Open University will be returning with regular video presentations on expert systems in British industry and image processing, and one to one consultations will be possible between viewings.

One of the more exotic attractions at the show will be a chance to win a holiday for two in Thailand. The 14-day holiday which is worth £2,500 can be won by simply entering a draw – so make level two one of your first stops.

Tickets are available at £3 each from the Keith Prowse ticket agency (01-741 9999) or at the door.

DIMENSION computers l.t.d.

27/29 High Street
Leicester LE1 4FP
Tel: (0533)
517479/21874

THE MIDLAND'S LARGEST COMPUTER STORE

CBM 64/128 and PLUS 4 COMPANIES PACK
Sales/Purchase/Nominal Ledgers with Invoicing and Stock Control, Disc £24.95
"Very easy to use — probably the friendliest package I have come across."
Commodore User

VIZA
Vizastar XL8 64 .... ~~£99.95~~ £79.95
Vizastar XL8 128 .... ~~£129.95~~ £99.95
Vizawrite Classic 128 .... ~~£99.95~~ £79.95

PRECISION
Superscript 64 .... ~~£60.95~~ £39.95
Superbase 64/+4 .... ~~£90.95~~ £39.95
Superscript 64
& Superbase 64 .... ~~£169.90~~ £69.95
Superscript 128 .... ~~£89.95~~ £49.95
Superbase 128 .... ~~£99.95~~ £49.95
Superscript 128
& Superbase 128 .... ~~£189.90~~ £89.95
Superbase, The Book £11.95

GEOS
CBM 64/128 Operating System
Including: Desktop, Geowrite, Geopaint, and Desk Accessories, Disc £49.95

GEOFILE
Geos Based Filing System, Disc £37.50

COMMODORE 128 COMPENDIUM PACK
Commodore 128 Computer, C2N Data Recorder, Music Maker Keyboard, Spirit of the Stones, Jack Attack and International Soccer Software £269.95

AMIGA RANGE

including COMMODORE VOUCHER OFFERS

AMIGA A500/CBM MONITOR OFFER
AMIGA A500 with **COMMODORE 1081 HIGH RES COLOUR MONITOR**, Mouse, Workbench, Basic and DPAINT Software
NORMALLY £972.90
WITH 2 ★ COMMODORE VOUCHERS. £749.95

AMIGA A500
with Mouse, Workbench, Basic, DPAINT Software and TV Modulator
NORMALLY £573.85
WITH 1 ★ COMMODORE VOUCHER ... £469.95

AMIGA A2000 SYSTEM

AMIGA A2000 COMPUTER with **COMMODORE 1081 HIGH RES COLOUR MONITOR**
Including 1 year on-site maintenance . £1259.00

PHILIPS 8833 COLOUR MONITOR
High Res with Stereo Sound Output £279.95

AMIGA A500
Upgrade to 1 Mb £113.00

DIGIVIEW 2 Video Digitiser £169.95
"Hardware product of the year."
Amiga developers conference.

GENLOCK — Video controller. Overlays text and graphics onto video pictures.
A1000 Version .... ~~£494.50~~ £449.00
A500 & A2000 Version .... ~~£529.00~~ £479.00

AMIGA A500/8833 MONITOR OFFER
AMIGA A500 with **PHILIPS 8833 HIGH RES COLOUR MONITOR** with STEREO SOUND OUTPUT, Mouse, Workbench, Basic and DPAINT Software
NORMALLY £853.80
WITH 1 ★ COMMODORE VOUCHER ... £699.95

COMMODORE 1081 HIGH RES MONITOR
NORMALLY £401.00
WITH 1 ★ COMMODORE VOUCHER ... £299.95

PAGESETTER — Desktop Publishing
System .... ~~£149.95~~ £109.95

SCRIBBLE II —
Word Processor .... ~~£99.95~~ £89.95

GOLDSPELL — Scribble
spell-checker .... ~~£44.95~~ £37.95

WORDPERFECT — The best word processor on the IBM now available
for the AMIGA £295.00
DELUXE PRINT .... ~~£91.00~~ £79.95
DELUXE VIDEO .... ~~£91.00~~ £79.95
MUSIC CONSTRUCTION SET ~~£90.95~~ £84.95

DELUXE PAINT 2 .... ~~£149.95~~ £119.95

AEGIS ANIMATOR/ IMAGES .... ~~£119.95~~ £99.95

AEGIS SONIX —
Synthesiser package .... ~~£79.95~~ £69.95

FEW ONLY
Commodore MPS 801
80 Column Tractor Feed Dot Matrix Printer £99.95
Commodore DPS 1101
Daisy Wheel Printer £199.95

STAR NL10 Dot Matrix Printer — Print Speed 120 cps in Draft Mode and 30 cps in Near Letter Quality Mode; Friction and Tractor Feed; 5K Buffer; Automatic Single Sheet Paper Set; Front Mode Select Panel
Commodore version (with CBM 64/128 Printer Lead) £229.95
Centronics version (with Amiga Printer Lead) £234.95
Optional Cut Sheet Feeder £63.95

1541C DISC DRIVE £199.95
1571 DISC DRIVE £249.95
Both the above include either:
Software Pack A
6 Infocom Disc Adventure Games, or
Software Pack B
Quick Brown Fox Word Processor, Easyfile Database and Future Finance Planning Package

COMMODORE 560P
2-colour Dot Matrix Printer takes 2¾in. roll paper .... ~~£49.95~~ £29.95

CITIZEN 120D NLQ PRINTER
Fully Commodore compatible £199.95
Commodore 1571 Double-sided Drive £239.95
Commodore 1901 Colour Monitor £299.95
Philips 64/128 Green Screen Monitor £89.95
Commodore 1541C Disc Drive £189.95
Commodore 128D £399.95
Commodore MPS 1000 CBM/Centronics Printer £229.95
Commodore 128 Computer £199.95

CBM 64/128 MUSIC EXPANSION SYSTEM
Including Keyboard, Synthesiser and Software £99.95

COMPOSER/EDITOR SOFTWARE
For Music Expansion System, Tape or Disc £24.95
3-slot switchable C64 Motherboard £16.95

ACTION REPLAY Mk III
Tape to Disc Back-up Cartridge £29.95

NEOS MOUSE
WITH CHEESE SOFTWARE, Tape or Disc £24.95

COMMODORE C2N DATA RECORDER £29.95

TROJAN CADMASTER LIGHT PEN
Commodore 64 .... £16.95
Commodore Plus 4/C16 .... £19.95

PRINTER RIBBON OFFER
MPS 801, 802 Ribbons £5.95
MPS 803 & MPS 1000 .... £4.95
MPS 1101 M.S. Ribbons £3.50
BUY FOUR AND GET ONE FREE!

THE EXPERT CARTRIDGE ESM
Tape to Disc System £29.95

FREEZE FRAME 4 .... £28.95

COMMODORE MPS 803 TRACTOR FEED UNIT £24.95

QUICKDISC + 1541 FAST LOAD/UTILITY CARTRIDGE £19.95
5¼" LOCKABLE DISC BOX 50 Capacity £9.95
5¼" LOCKABLE DISC BOX 100 Capacity £12.95

PERSONAL CALLERS AND EXPORT ENQUIRIES WELCOME
ALL OFFERS STRICTLY SUBJECT TO AVAILABILITY
ALL PRICES INCLUDE V.A.T. UNLESS OTHERWISE STATED

To order, either send cheque/P.O. with coupon or ring **(0533) 517479/21874** with Access/Barclaycard number. Please allow 7 working days for delivery from receipt of order or cheque clearance.
Please add £1.00 towards carriage and packing on any software order.
Hardware orders add £1.00 under £65.00 value, and £5.00 over £65.00 value.
Printer orders add £5.00 towards carriage.

Send to: Dept. No. YC10, Dimension Computers Ltd., 27/29 High Street, Leicester LE1 4FP.
Tel: (0533) 517479/21874 Fax: (0533) 511638

VISA

Item	Quantity	Price
....		....
....		....
	Total	....

Name..
Address..
....
Telephone:..

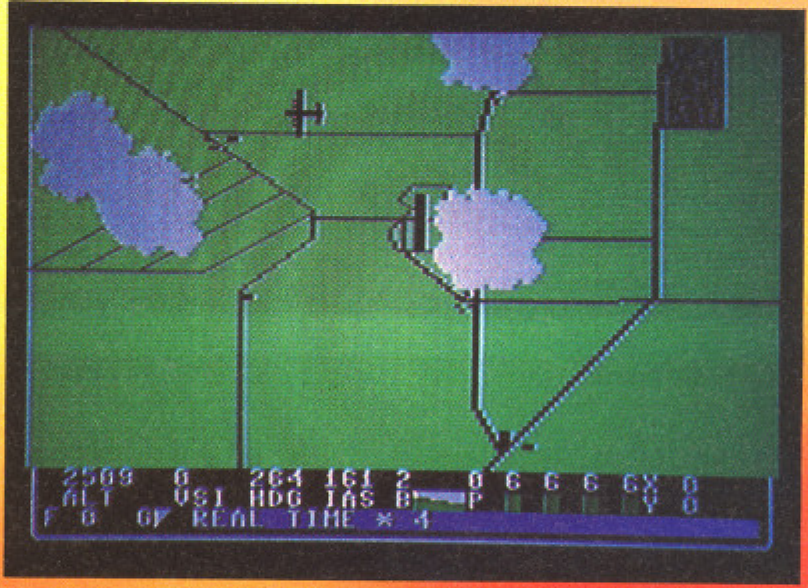
Combat Simulations

The following games are a selection from the growing band of simulations that pack a punch, and aren't just therapy for retired pilots suffering withdrawal symptoms.

By Tony Hetherington

If your idea of simulation is pressing 43 keys to lift a plane off the ground, only to circle around for half an hour before crashing, while attempting to land, then take a back seat as Combat Simulations puts you firmly in the thick of the action. You take command (and often the controls) of a war machine with a mission and a not just a sight seeing tour and you must strike first before the enemy turns you into scrap metal.

Inflight entertainment is for those who like their excitement without their feet on the ground and includes bombing raids in World War II, 100 missions for an Apache helicopter Gunship and futuristic fights for the SkyFox. Surface tension takes to the high seas and on patrol in a Destroyer unit finally we plunge into deep trouble and dive! dive! dive! into submarine action.



Inflight Entertainment

Flight simulators were slow to take off with programmes that were difficult to use and were little more than sight-seeing tours leaving the player to devise more and more spectacular ways of crashing. Flight simulators needed more action. These high flyers have plenty of action packed into dogfights and bombing raids and are as different as the aircraft they simulate.

B24

In this latest combat flyer you take control of not only one plane but a full squadron of 40 B24's in bombing raids on the oil refineries of Ploesti, Rumaina. Your mission is to knock out the oil supply for Hitler's war machines. The real B24 squadron that was given this task started with 60 aircraft and were left with only four after flying 50 missions. You have only 40 bombers and 19 missions to knock out 12 targets.

With a mission that's tough you're going to need some practice and so two other targets are included and so you train-as-you-bomb Mostar in Yugoslavia (just over the Adriatic Sea from your base in Spinazzola, Italy) and the heavily guarded Rumanian city of Bucharest. Survive these training missions with your squadron in tact and you're ready for the main event.

To help you plan your assaults the game disk or tape is accompanied by a map of your targets and possible routes, an intelligence report on Ploesti and an instruction booklet that includes a step by step guide through the Mostar mission.

The first step of a mission is to take off and circle at about 2000ft as the other planes slot into formation. Then you must rendezvous with your fighter escort, precede to the target and start your bombing run. The effectiveness of your run is increased if you're flying at the correct height and speed for your bomb load and deliver it on the target. Once you've done this you should get out of the area as quickly as possible and get your squadron back to base with as many planes as possible fit and fueled for the next mission.

B24 is one of SSI's superb strategy games and despite its crude graphics, it's a frantic game to play. It was designed by two bomber pilots, so you can be sure it's accurate, and you can speed up real time to fly past the long flights to and from

the target. The game assumes that Squadron Leaders know how to fly a plane and leave you with minimal controls but plenty to do as you plan rendezvous routes with fighter escorts, bomb targets and return to base while coping with damage to your own aircraft. One mission down, 18 to go and you've already lost four aircraft and another six need repairs!

Touchline:
*Title: B24. **Supplier:** US Gold/SSI, Unit 2/3 Holford Way, Holford, Birmingham B6 7AX. **Tel:** 021-356 3388. **Machine:** C64. **Price:** £19.95 (d), £14.95 (c). **Originality:** 7/10. **Graphics:** 4/10. **Playability:** 7/10. **Value:** 7/10.*

Gunship

A former Game of the Month (May '87) Gunship took flight simulators to new heights and its players on 100 missions that range from the training field of the USA to the battlefields of the world.

The Apache helicopter gunship is remarkably easy to fly considering there are 31 keyboard and joystick controls thanks to a keyboard overlay and two 'fly and fight them' tutorials.



When you've graduated from the training fields you're ready for your first sortie in South East Asia. After an intelligence report and mission details of your primary and secondary targets you must arm your Apache with a balance of 30mm cannon ammo, Hellfire missiles, Ffar rockets and Sidewinder air to air missiles. The exact nature of your weapons is decided by the mission you're on and the enemy forces that you're expecting. Cannon fire is good at close range but you'll also need some Ffar rockets to take out infantry and gun emplacements where as Hellfire missiles are needed for armoured targets such as tanks and bunkers leaving the Sidewinder to greet enemy Hind helicopters.

As you travel the globe from Asia to the Middle East, Central America and Europe you'll be challenged by more powerful and better equipped enemies and will need all your electronic counter measures, flares and chaffs to stay in the air long enough to complete your mission.

Succesful missions will earn you points, medals and even promotions until eventually you'll retire as a heavily decorated Colonel.

Gunship is a massive 100 mission, 3D flight simulation where the sky is the limit for the pilot skilled in combat flying.

Touchline:
*Title: Gunship. **Supplier:** Microprose, 2 Market Place, Tetbury, Gloucestershire GL8 8DA. **Tel:** 0666 54326. **Machine:** C64. **Price:** £19.95 (d), £14.95 (c). **Originality:** 8/10. **Graphics:** 8/10. **Playability:** 10/10. **Value:** 10/10.*

Aces of Aces

The Moquito fighter bomber flew a variety of missions during World War II and now it's your turn to take the controls as you try to become the Ace of Aces.

The game begins in the briefing room as the C.O. outlines the tasks ahead to destroy the U-boats as they leave their base, shoot down incoming bombers, deflect V-1 rockets and destroy a POW train but not the cars containing the prisoners. These missions can be tackled individually but to become the Ace of Aces you will have to tackle them all in a single sortie.

To fly the mission, you will have to master the controls on five screens that show your left and right wings and engines, bomb bay and weapon selector, operations map and forward view from which you must fly the plane and shoot down enemy aircraft.

Ace of Aces owes a lot to an earlier Artech game based on the Dambusters but features more options, missions and a lot more action.

Touchline:
*Title: Ace of Aces. **Supplier:** US Gold (Artech), Unit 2/3 Holford Way, Holford Birmingham B6 7AX. **Tel:** 021-356 3388. **Machine:** C64. **Price:** £9.95. **Originality:** 7/10. **Graphics:** 7/10. **Playability:** 9/10. **Value:** 8/10.*



Skyfox

Skyfox is an all action 3D combat flight simulator set in the near future where you must battle an alien invasion force of tanks, planes and motherships. The scenarios range from training missions to all out invasions that have descriptive names such as the Alamo, Massive Onslaught and Cornered.

The screen display shows the cockpit of your Skyfox Phantom showing the radar scanner to plot the position of

the enemy, shield, fuel and speed indicators as well as your view of the battlefield. You can punch up a computer screen which will plot your position as well as those of the enemy tanks, planes and motherships. Your first target must be the motherships as these can launch squadrons of tanks to destroy your installations. Lose these and you lose your chance to refuel and rearm. You can then choose whether to take on the tanks at ground level or zoom up above the cloud cover to dogfight with the enemy aircraft.

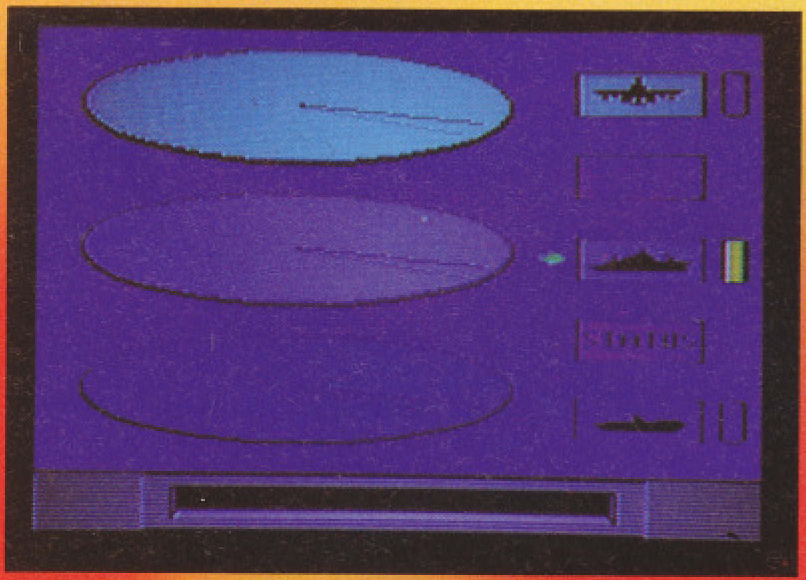
A great game which was one of Ariolasoft's greatest hits and could get a new lease of life as Electronic Arts set up a UK base.

Touchline
*Title: Skyfox. **Supplier:** Electronic Arts, Angley Business Centre, 11-49 Station Road, Langley, Nr. Slough, Berks SL3 8YN. **Tel:** (0753) 49442. **Machine:** C64. **Originality:** 7/10. **Graphics:** 9/10. **Playability:** 9/10. **Value:** 8/10.*

Here's a duo of destroyer action in which you must protect the free world from air, sea and underwater attack in Convoy Raider and Captain your ship in seven different Destroyer missions ranging from a Subhunt to Convoy Escort.

Convoy Raider

In Gremlin's Convoy Raider your mission is to patrol the Inland Sea and attack and destroy any enemy planes, ships or aircraft that you find. Finding them isn't a problem as they'll find you even if you don't leave your port. Surviving is the skill.



The action is controlled from five screens that are accessed from a radar screen with three sweeping radar displays showing the presence of any enemy in the sky, on the surface or underwater. If a blip shows up on any of these you must go the appropriate battleships. You must man the anti-aircraft sea wolf missiles to shoot down enemy planes or incoming Exocet missiles, the depth charge helicopters to destroy submarines and guide your own Exocets to knock out enemy shipping. You must pilot your movements around the Inland Sea using the map screen and assess the state of your ship from the damage screen.

The action is fast and furious but isn't quite up to the standards of the other simulations.

Touchline:
*Title: Convoy Raider. **Supplier:** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS. **Tel:** 0742 753423. **Machine:** C64. **Price:** £9.99 (c), £14.99 (d). **Originality:** 5/10. **Graphics:** 5/10. **Playability:** 7/10. **Value:** 5/10.*

Destroyer

Can you man 13 stations on a Fletcher class Destroyer, all at the same time? Can you also use these stations to complete one of seven missions on the high sea? You will need to do all this and more as you take the helm in Epyx's Destroyer as well as the radar, sonar, navigation, bridge, observation deck, forward and aft guns, port and starboard anti-aircraft guns, port and starboard torpedo tubes, depth charge and damage control stations! You move between the stations by typing in two letter codes such as BR for bridge and after a few seconds you're faced with a new set of controls. Most controls are self-explanatory such as aiming guns or torpedoes before firing or setting the depth charges to a bracket of depths for a better chance of taking out a submarine.

In the controlled panic of a full mission you will need all your skill and strategy to ensure that you get your shot in first, and that it counts as you can't afford long battles with a single enemy ship when you've got a convoy to protect and damage control crews to assign, a course to plot and so on. An excellent multi-screen simulation.

Touchline:
*Title: Destroyer. **Supplier:** US Gold/Epyx, Unit 2/3 Holford Way, Holford, Birmingham B6 7AX. **Tel:** 021-356 3388. **Machine:** C64. **Price:** £9.95. **Originality:** 7/10. **Graphics:** 9/10. **Playability:** 9/10. **Value:** 9/10.*



The stealth of a submarine as it lurks unseen underwater only to surface and strike at the heart of a convoy has always been great material for a game. Until now, C64 submariners could only sign up for the Silent Service. Now they can also go on patrol in Up Periscope and will soon be able to dive! dive! dive! with the submarine version of Epyx's Destroyer.

Up Periscope

Illionis based ActionSoft have produced one of the best

simulations you're ever likely to play as you take to the depths in a World War II fleet class submarine.

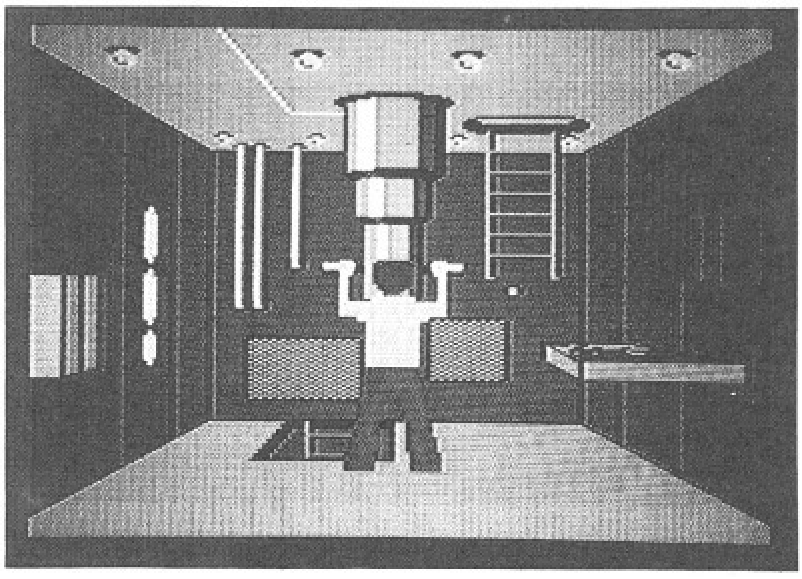
The screen display is split into three sections. A strip across the top of the screen shows the command options available and highlights those selected. Below that a 3D view displays what you can see from either the conning tower or the periscope and below that is an instrument panel showing your bearing, depth, speed, power, torpedos left and every other dial or reading you'll need to find your targets and sink them.

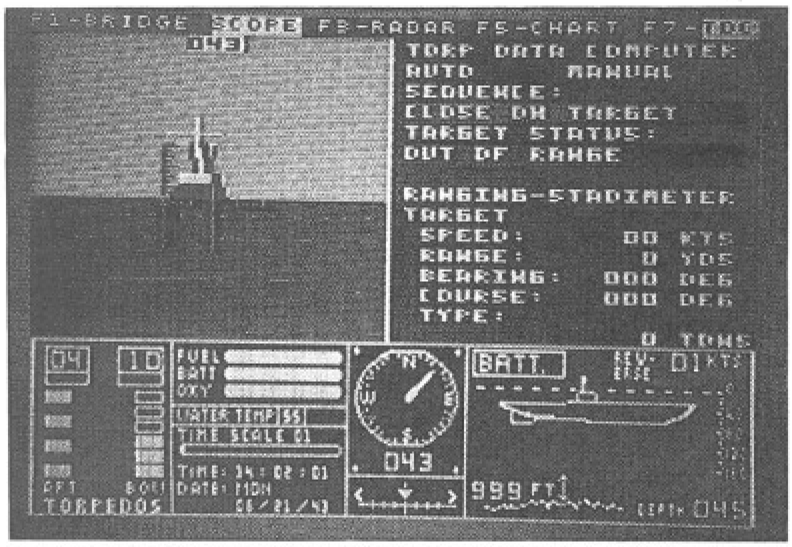
If you select the charts to plot your position or the radar to search for enemy destroyers or perhaps the torpedo data computer to lock on target then the 3D view will swap to a split-screen display with the instrument occupying the right hand side and the important part of the 3D view on the left. The result works extremely well either in a practice mode or on patrol in the Pacific.

The graphics are quite exceptional and are the result of ActionSoft using Sublogics 3D routines pioneered in its flight simulator.

A copy of this game arrived in the *Your Commodore* office in an unmarked pack and it took some time to track down where you could get it. There isn't a UK version of it yet so if you want a copy of the game disk, instruction book and tactics manual you'll have to get an imported copy from Strategic Plus Software.

Touchline:
Title: *Up Periscope.* ***Supplier:*** *Action Soft/Strategic Plus Software, P.O. Box 8, Hampton, Middx. TW12 3XA.* ***Tel:*** *01-979 2987.* ***Machine:*** *C64.* ***Price:*** *£30.*





Silent Service

Silent Service was the first submarine simulation to reach these shores courtesy of US Gold.

Once the game has loaded and the scenario selected, the program displays the bridge with you standing by the periscope. If you press the button you can see through the scope (if you're not below periscope depth) but you can also move the joystick to go up to the conning tower to fire the deck gun, to the map table to plot a route and to the instruments to change course. Once selected the screen changes to show the relevant display.

As in Up Periscope you can put your submariner skills to the test in a series of scenarios and war patrols in which your targets will be tankers and troop ships and your enemy the destroyers. To add to your problems you can include a selection of reality factors such as poor visability, zigzagging convoys, dud torpedos and the worrying expert destroyers.

Silent Service is the easier submarine game to play but Up Periscope will provide a better campaign game. You may even get promoted.

Touchline:
Title: *Silent Service.* ***Supplier:*** *Microprose, 2 Market Place, Tetbury, Gloucestershire, GL8 8DA.* ***Tel:*** *0666 54326.* ***Machine:*** *C64.* ***Price:*** *£9.95.*
Originality: *7/10.* ***Graphics:*** *8/10.* ***Playability:*** *8/10.* ***Value:*** *9/10.*

YC

Bothersome Basic

Given up on Basic or never got started? It does have its uses – and it is worth having a second go, so follow this series. . .

By Eric Doyle

For several years now, Basic has been courted, struggled with and ultimately ignored by countless thousands of would-be programmers. The main problem is that there are very few training courses specifically aimed at the Commodore 64 home user. I was myself involved with an enterprise aimed at bringing Basic to the masses through intensive weekend courses. One message was clear, it is not easy to learn from manuals alone and most people require clear concise instruction to help them understand the whys and wherefores of specific programming problems.

Having just alerted the Editor to the apparent futility of this series I'd better quickly explain my Basic philosophy!

This series will deal with all aspects of Basic for the beginner, the crest-fallen and the persistent keyboard basher. If you find you don't understand any area that we cover during future months, pick up your pen and write to me. If a routine in one of your programs refuses to respond to gentle persuasion, let me know. Before I disappear under a flood of white envelopes I will say now that I can't promise to have enough hours in a week to answer all of your individual problems but I do promise to give all the help I can but only if you follow the instructions at the end of this article.

Each month the article will deal with a simple programming technique followed by a deeper dive into the workings of the computer which may be too advanced for those just wishing to write some useful routines, but which will provide the key to a fuller understanding of computers for those who wish to progress to machine code routines later on.

Essential Attitude

A good attitude to take towards your computer is to think of it as a foreigner with a limited command of English. The first reaction a confused tourist will experience is the natural assumption that they're as thick as two short planks and as deaf as a post. In most cases this is not really a fair attitude but with a computer nothing could be nearer the truth. If you don't believe me think of all the times the machine has refused to perform the simplest of tasks without fault and consider why we have to use CAPITAL LETTERS!

Presumably you will all have read the erudite and definitive training given in the Commodore manual and, despite this handicap, have nevertheless gleaned a few of the very basic commands available to you. I will assume that you can now successfully PRINT messages on the screen and that you will also have sussed the fact that programs consist of numbered lines of instructions which the computer slavishly reads and obeys unquestioningly. A simple program would look like this:

```
10 PRINT "DON'T PANIC"
```

Type RUN and the words DON'T PANIC appear on the screen. All very comforting but not exactly useful.

We can get the computer to do something fractionally more thrilling by using a device known as a loop. This causes the program to madly repeat the program over and over again. The simplest way to do this is to add the line:

```
20 RUN
```

All this does is to get the program to re-run time and again and, despite the comforting message, it will induce extreme panic in the beginner when the wretched machine refuses to stop. Don't reach for the power switch, simply press the key marked RUN/STOP on the extreme left of the keyboard and the computer will take a break until you type in RUN again.

Believe it or not, one of the most common faults at this level of programming is to forget to press the RETURN key when typing in the program. If your computer isn't behaving properly type LIST (remember to press RETURN) and the contents of the program memory will be revealed.

Now that you're fully equipped with a way to drive computer salesmen up the wall with eternally repeating rude messages at your local computer store let me say that he will not be impressed with your programming style! Far better to substitute line 20 with:

```
20 GOTO 10
```

This simply tells the computer to loop back and repeat line 10 ad nauseam or until the RUN/STOP key is pressed.

Once again we have produced a program with very little practical application except for hi-tech vandals who make the saleman's life a misery of continual vigilance.

To Usefully Go (To)

Before we see how the GOTO command can be used in a sensible way, we have one more kind of loop to consider which introduces a basic concept used by all programs: the variable.

Type NEW, press RETURN and you will clear the computer's memory ready for a new program. If you try LIST at this point the computer will simply respond with the word READY so type the following program in:

```
10 FOR A=1 TO 10
20 PRINT "DON'T PANIC"
30 NEXT A
40 PRINT "FINISHED"
```

Run the program and you will find the phrase printed just ten times on the screen. To explain this miraculous phenomenon concentrate on line 10.

The letter A is known as a variable. The best way to imagine this is to think of the computer as a stack of boxes. We have asked the computer to mark one of these boxes with a big letter A in which it will store anything we say that A is equal to. You may now think that we've told the computer that A=1 but what about the TO 10 bit? The main thing about a variable is that it can be varied! We've told the computer that A will vary between 1 and 10. The computer translates this as meaning that A will have a value of one at the beginning of the program so it stores that value in the box labelled A.

The program then runs to line 20 and prints the message. Then when line 30 is translated the computer checks back to where A=1 TO 10 was encountered and loops back to that line. Now the clever part occurs. Checking the contents of box A the computer finds that it still contains a one. Having been told that A will vary between 1 and 10 it increases the content of the box by one so that A now contains the value two. Line 20 is obeyed and NEXT A is encountered again so it loops back to line 10. Once more the content of box A is increased by one to three and the whole process is repeated until A has a value of ten.

When A is increased the computer checks to see if that number is greater than ten. We have now reached the point where A=10 and is incremented to eleven this is bigger than ten and so the program jumps to the line after the NEXT A command and FINISHED is printed on the screen.

How can we prove that this happens? First of all type PRINT A and press RETURN. The value eleven is printed on the screen. Hmm, it seems plausible but we need proof.

Semi Differences

Let's try something different. LIST 20, move the cursor to the end of line 20 and type in a semi-colon. Press return and LIST the program. Masterfully, the computer should have inserted the altered line in its correct place in the program:

```
10 FOR A=1 TO 10
20 PRINT "DON'T PANIC";
30 NEXT A
40PRINT "FINISHED"
```

Change line 40 to read PRINT A and run the program. This time the message is printed ten times across the screen with 11 printed at the end. The semi-colon tells the computer that the next PRINT statement will continue from where the last print statement leaves off. Alter line 40 to:

```
40 PRINTA:PRINT"FINISHED"
```

Re-run and you'll see that the number 11 is now printed on a separate line. We have ended the semi-colons dictatorial reign. As you can see more than one command can be written on a program line as long as you separate the commands by a colon. NEW the program and type this in:

```
10 FOR A=1 TO 10:PRINT A;
"DON'T PANIC":NEXT A:? A
```

Don't worry about the question mark in line 10, just type in the line as printed here and run the new program.

This time the messages are preceded by a number which is the current value of A. List the program and you'll find that the question mark has changed to the word PRINT. The computer has a built-in shorthand

Command	Abbreviation	Command	Abbreviation
ABS	aB	NEXT	nE
AND	aN	NOT	nO
ASC	aS	ON	on
ATN	aT	OPEN	oP
CHR$	cH	OR	or
CLOSE	clO	PEEK	pE
CLR	cL	POKE	pO
CMD	cM	POS	pos
CONT	cO	PRINT	?
COS	cos	PRINT#	pR
DATA	dA	READ	rE
DEF	dE	REM	rem
DIM	dI	RESTORE	reS
END	eN	RETURN	reT
EXP	eX	RIGHT$	rI
FN	fn	RND	rN
FOR	fO	RUN	rU
FRE	fR	SAVE	sA
GET	gE	SGN	sG
GET#	get#	SIN	sI
GOSUB	goS	SPC(	sP
GOTO	gO	SQR	sQ
IF	if	STEP	stE
INPUT	input	STOP	sT
INPUT#	iN	STR$	stR
INT	int	SYS	sY
LEFT$	leF	TAB(	tA
LEN	len	TAN	tan
LET	lE	THEN	tH
LIST	lI	USR	uS
LOAD	lO	VAL	vA
LOG	log	VERIFY	vE
MID$	mI	WAIT	wA
NEW	new		

which can save space and time. You may have encountered listings which have lines that the computer refuses to accept because they stretch beyond two lines of text on the screen. This is known as the logical line length which, logically, is the maximum length of a line and equals 80 characters or in other words two screen lines.

We'll come back to this later so store it as the back of your mind in a box marked 'Don't Forget'.

Nine Times?

Let's put our loop to some serious work. A computer is more than a sophisticated adding machine but it can be used to best effect for calculations. Let's construct a program which produces the nine times table. We could do this in the long winded way which would repeat lines such as:

```
10PRINT"2 × 9 = ",2*9
20?"3 × 9 = ",3*9
```

and so on, but using a loop simplifies all this typing:

```
10 FOR A=2 TO 12
20 ?A;" × 9 = ";A*9
30 NEXT
```

You'll notice that I've failed to type A after NEXT in line 30, preferring to let the computer decide which variable we're currently using. This variable's name is not particularly helpful when you come back to look at the listing in ten years time so why not use the computer's ability to understand longer variable names. It could easily be called NUMBER instead of A, but you must change the name in each line where is appears.

We can run two loops at the same time by placing one inside the other:

```
10 FOR MULTIPLIER=2 TO 12
20 FOR NUMBER=2 TO 12
30 ?NUMBER:" ×";MULTIPLIER;"
=";NUMBER * MULTIPLIER
40 NEXT NU,MU
```

Running this program causes the computer to put up the full set of tables from two to 12 but it all goes too quickly for any practical purpose.

You'll also notice that I've only used the first two letters of each variables name in the NEXT statement. The name of a variable is a bit of a con because the computer only labels the relevant boxes with the first two letters of the variable's name. When naming variables you must always remember this because the computer would treat variables called MULTIPLIER and MULTIPLICAND as the single variable MU and chaos would result.

Loops Within Loops

You'll also have seen that I've gone back to naming the variables after the NEXT statement. When more than one variable is used it's safer to do things this way but make sure that the variables are named in the correct order. The computer will not accept loops which are not properly 'nested' inside one another. In other words the following is acceptable:

```
10 FOR A=1 TO 10
20 FOR B=1 TO 5
.
.
.
.
120 NEXT B,A
```

But in the following, the loops are not nested loops and would cause problems:

```
10 FOR A=1 TO 10
20 FOR B=1 TO 5
.
.
.
.
120 NEXT A,B
```

Meanwhile, back in our program there is one way to make it easier to see the times tables by adding the following line:

```
40 NEXT NU
50 FOR DELAY=1 TO 250:NEXT
60 NEXT MU
```

Now the program pauses between each table printout. Line 50 simply makes the computer count to 250 before continuing. Try varying the value and see what happens.

Know Your Shorthand

Before I pull the plug on this week's beginner's course let's go back to the computer shorthand.

Apart from the question mark for PRINT, most of the other keywords can be shortened by using the first one or two letters of the keyword followed by the next letter Shifted. The best way to see this is to switch the computer into lower case mode by holding down the Shift key and pressing the Commodore key once.

Type in the following:

```
10 ?:pO:nE:rU:reT
```

List the program and you'll find the keywords revealed in full. A full list of abreviations can be found near the back of your Commodore manual but I included it here to show the number of command keywords at your service.

The Deep End

The following line extends beyond the logical line on the screen. Try entering it as printed here and see what happens when you press RETURN:

```
10PRINT "THIS WOULD NOT
FIT INTO ONE PROGRAM LINE":
FOR A=1TO 10:POKE1024+A,0:
NEXT:?"BYE"
```

Next switch to lower case and enter the line as follows:

```
10 ?"this would not fit into one
program line", fO a=1to19:pO102+a,
0:nE:?"bye"
```

This time the line goes into memory. List it and it does the impossible by stretching over three screen lines. Why?

To understand this phenomenon you have to realise that every character in a program line is stored as a separate number in consecutive memory locations. Keywords are stored as a single number no matter how long their real name is. PRINT is stored in memory as the value 153 but in a statement such as:

```
PRINT "PRINT YOUR NAME"
```

the first PRINT would be stored as a single byte of value 153 but the second PRINT in the quotation marks would be stored as a string of ASCII codes for the relevant letters: 80,82,73,78 and 84. If it were possible to poke a line directly into memory you could feasibly enter almost 40 keywords on one line!

*Send your problems to Eric Doyle, Bothersome Basic, Your Commodore, ASP Ltd, 1 Golden Square, London W1R 3AB enclosing any relevant printouts or listing recordings relating to your query. I'm afraid that **I cannot** answer queries by phone under any circumstances.* YC

Mini Office II



6 powerful home and business programs in just ONE package – at a price that simply can't be matched!

It's a brilliant introduction to business computing. The only fault I can find is that it's just too generous for the price – Database could have sold it for a lot more. It makes some of its over-priced competitors hang their heads in shame.
– *Commodore User*

Outstanding value for money . . . If you want to use your 64 as a highly efficient office machine, Mini Office certainly gives you the power you need.
– *CCI*

'This package is incredible value'
– *Daily Mail Home Computing Guide*

Voted Business Program of the Year – 1985 *AND* 1986
Pop. Computing Weekly

WORD PROCESSOR
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!

SPREADSHEET
Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, move directly to a specific location, recalculate automatically – and more!

GRAPHICS
Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!

DATABASE
Build up a versatile card index, use the flexible print-out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!

COMMS MODULE
Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!

LABEL PRINTER
Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

DATABASE SOFTWARE Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY

ORDER FORM

Please send me Mini Office II for the Commodore 64/128

☐ £16.95 cassette
☐ £19.95 5¼" disc

I enclose cheque made payable to Database Software, or debit my Access/Visa card:

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Exp. date ______

Signed ....

Name ....

Address ....

....

....

ORDER HOTLINE: TEL: 061-480 0171

SEND TO: Database Software, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

AO39

Computer Communications

Communicating with computers is very fashionable at the moment, but can also seem very confusing to the novice. We take an in-depth look at what communications are and why they are needed.

By Jennifer Goldsmith



We all know and understand what is meant by human communications but computer communications are different, or are they? They are different because a computer is a machine which cannot think, but which is programmable and more importantly we can get to the inside of a computer whereas we cannot connect a lead from one person's brain to another! A computer and a person are similar in the way that data (ideas or words) is sent from one machine and received and interpreted by another. That's fine, you may say, but why do two computers want to communicate?

The answer is simple, we want them to. We want and need the information which is only available through them. In a large company, perhaps using different systems, information may need to be transferred from one computer to another within the same building, so a phone line is not necessary but a fast rate of transfer (baud rate – explained later) is.

On the other hand, to transfer data between different offices or between your home and a computer miles away necessitates the use of a telephone line (except in a specialised field where data is transmitted via satellite). A telephone line limits the rate of transfer which can can take place.

Connecting Your Computer to the Phone Line

In order to connect your computer to the phone line, there are two essential items you need.

First of all, your phone line must have the 600 Jack type sockets. These sockets allow you to plug in your phone, answering machine or modem providing of course, that the peripheral, i.e. your phone or item that you wish to plug in, is fitted with a little white plug.

Secondly you need a modem. The word modem is an abbreviation of the words MODulator DEModulator. The signals a computer understands are not the same as those which go along a telephone line and therefore a translation process is necessary at both the sending and receiving ends. This translation process is carried out by the modem.

Also the software used depends on the modem you use and the purpose for which it is to be put. Some modems come with software either in them (in ROM) or on disk with them, others require you to purchase the software separately.

Which Modem?

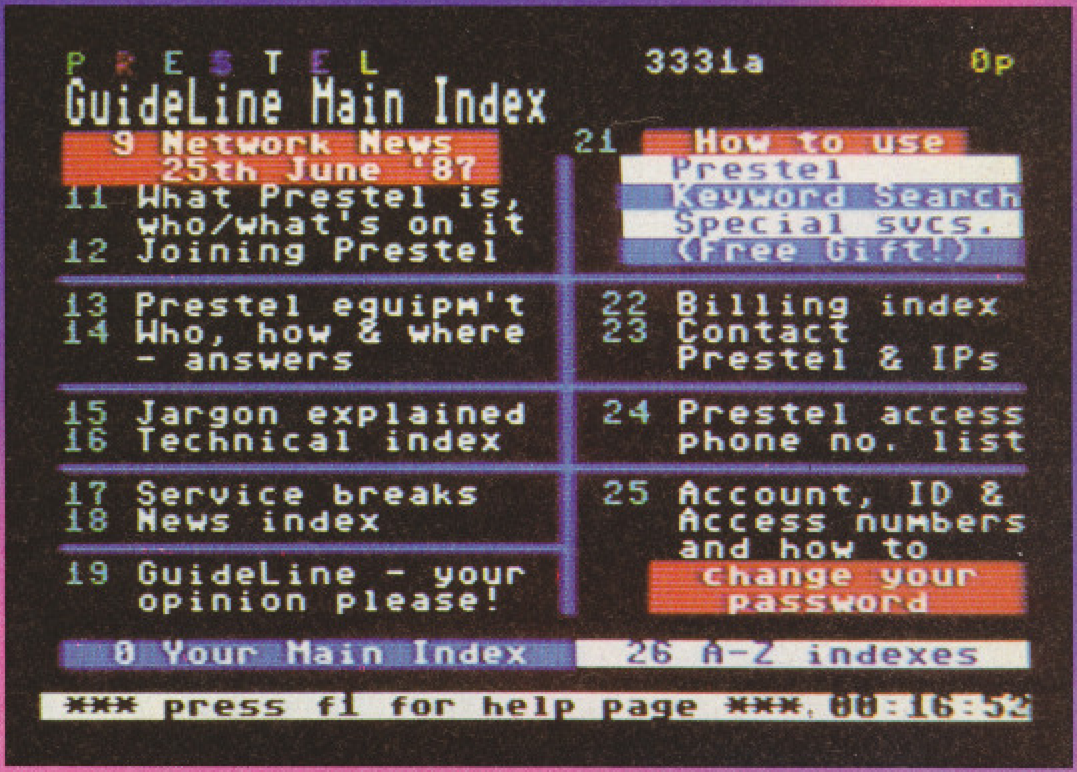
Before this question can be answered, you have to decide what services you want to access with your computer, in other words you have to decide what you want to do once you have it connected up. It's rather like buying any other software; you have to decide what features that software should have, which will be dependent on what you want to do.

Which Features?

The first thing to consider when deciding on which modem to use, is baud rate. Baud rate is the rate at which data transfer occurs and is measured in bits per second (bps). (Remember that a single character is made up of eight bits or one byte, at least as far as eight bit machines are concerned.)

However, when characters are sent from one machine to another, additional signals are needed to indicate to the receiving computer, i.e. 'end of character'.

Therefore, as a rule of thumb, when converting from baud rate to



characters a second, you should divide by ten. Thus a baud rate of 300 is equivalent to 30 characters per second. Also the maximum baud rate which most telephone lines can use in this country is 1200 bps.

The common baud rates used in Britain over the telephone line are 300/300, 1200/75 and 1200/1200.

When baud rates are written, the downloading or receiving rate is written first and the uploading or sending rate is written second. In two out of three cases the rates in both directions are the same.

The baud rate 1200/75 is very popular in Britain, (although never used in America) enables information to be received at 1200 bps, yet sends information at only 75 bps. The baud rate 300/300 is used for Telecom Gold, Packet Switch Stream (PSS) and bulletin boards both in this country and the USA.

The baud rate 1200/1200 is used mainly for user-to-user file transfers and fast upload by editors on Prestel and Compunet. This is also used in the USA. Companies such as Prestel, Compunet, Telecom Gold, PSS and bulletin boards favour 1200/75.

Mini Update

Without going into too much detail at this stage, I'll briefly explain some words that I've used.

Prestel is a service run by British Telecom, yet its information comes from various firms, organisations and hobbyists.

Compunet is a service run by Compunet Teleservices Ltd and is specifically for 64 and 128 users at the moment.

Packet Switch Stream is a service run by British Telecom (in this country) which allows you to access computer systems in other countries, e.g. USA, Europe, etc. which use different communications protocols, i.e. have different parameters, to our own.

Telecom Gold is another service run by British Telecom.

Bulletin Boards are services provided by private individuals or companies for people with similar interests, e.g. a catalogue of a company's products, or a particular hobby such as amateur radio or commodore users.

Interfacing the Modem to the Computer

When deciding which modem is needed, the next part to consider is how to interface the modem to the computer. The two main interface standards used are a) interfacing to the cartridge port and b) interfacing with the RS232 (usually via the user port). This can be an important point to consider, e.g. if you plug a modem or cartridge into the cartridge port of the 128 it will power up as a 64. Also some software will not let you print out via the user port if the modem is plugged into the cartridge port, but this is much more of a software problem.

What Must the Software Do?

Thirdly, and perhaps the most important issue, is software. Must the software be viewdata compatible? Viewdata compatible is the term used for systems which work like Prestel where a 'page' of information comes up in colour on your TV screen using 1200/75 baud rate. It is similar to teletext, but not identical.

Compunet is another system where you receive a screenfull of information at a time but are its protocols (parameters) different to those of Prestel? Have you thought about sending and receiving files via the phone line so you can work in conjunction with your friends miles away? Do you want to be able to look at Bulletin Boards and if so at what baud rate? For the more adventurous, how about running your own bulletin board or becoming an editor on Prestel? Do you want to be able to print the information out on paper (e.g. a screen dump)? And so on.

Finally, there are the more 'advanced' features which you look for in a modem, e.g. can it autodial? That is, can you type in the number at the keyboard and let the modem dial for you? Can the modem autoanswer, e.g. if someone rings your number, will the modem answer? This feature is only really necessary if you are running a bulletin board and then it becomes essential. Has the modem error-checking? This is a very important feature if you are downloading software, i.e. receiving a file from another computer, e.g. Prestel, and storing it on disk. Another question to be asked is whether the modem is full-duplex or half-duplex? Full-duplex is a true two-way communication because your computer screen displays what you are typing, as well as what is being typed on the other computer. (Actually, whatever you type, is first sent to the other computer and then sent back to your computer and displayed on the screen. So if you are using full-duplex and your typing appears on screen, you know that the connection has been made.) Half-duplex, however, lets you see only what is typed on the other computer. Some services use full-duplex and others half-duplex, and so it is necessary to consider this feature with baud rate once you know how you will be using your modem.



Comparing the Modems Available

Today there are many modems on the market. I will discuss some of them, along with the various software packages that either come with them or which can be bought separately. This will provide you with sufficient information to let you investigate on your own before deciding which products to buy.

The Commodore Modem

This autodialling modem is no longer being manufactured but many do exist. It is the most versatile modem, in as much as you can access all systems with it. In fact, it is the *only* modem which can be used for accessing Compunet. The disadvantage of using the Commodore modem is that it works at 1200/75 or 1200/1200 (half-duplex) and does not work at 300/300. Compunet Teleservices do a very good, cheap deal if you purchase your modem when joining Compunet; the modem is given away free! (see later).

If you join Compunet, you can download (either for free or for a small charge) various software including software for accessing Prestel, terminal software (i.e. for accessing scrolling systems like Telecom Gold) and user-to-user software (for transferring files), from Y2. Software for prestel editing is available from Y2. This modem can be used with the 64 or 128. It is also British Telecom approved!

64 Multi-modem

The 64 multi-modem can be used with the 64 and 128 will let you operate at all three baud rates and has all of the software in ROM. It costs £116.15 including VAT, but has many features including autodial and autoanswer which includes facilities for logging callers and taking messages. The only additional software you need is user-to-user and to check whether the prestel editing software works with it. However as most people do not become editors on Prestel, this is not so important at this stage. Software for running a bulletin board is also available from Y2.

Voyager 7

The Voyager 7 is no longer being manufactured yet there are still a lot around as it has the advantage of being used on other micros, with the appropriate software. It is similar in specification to the 64 Multi-modem but a cartridge is included which provides the software you need. Although the cartridge plugs into the cartridge port, (logically!), the modem is an RS232 modem which is why it can be used on other micros.

Modems from Tandata

Tandata Marketing Ltd have produced various modems which use a serial interface from the TM110 which could be used with the VIC20, 64 and 128 at a cost of £99 compared with the TM512E which costs £339. Tandata's modems usually allow all the combinations of baud rate with both full and half duplex along with other facilities, like being able to store your phone numbers and passwords. This means that in order to log onto a system you simply press a couple of keys and the modem automatically dials the appropriate number and logs you on – very convenient, as long as the modem does not fall into the wrong hands!

Modems from Miracle Tech.

The 64 Multi-modem is a product from Miracle Technology but it cannot be used with other micros. On the other hand the WS2000, WS3000 and WS4000 are very versatile RS232 modems. The WS4000 costs £159 and has many features – as they all do. On the other hand the WS2000 costs only £99 and is still available. The WS3000 comes in various versions costing from about £300 upwards! They all come with the necessary software to drive both Prestel and Telecom Gold (terminal/scrolling software). There are various versions of these modems including some expensive ones, which have useful features like detecting the baud rate of the host machine and setting itself accordingly.

Connecting to a Service

Before powering up your computer, make sure that your modem is in place and correctly connected to your computer. Never connect or disconnect your modem once you have switched on the computer. Always switch off first. If you do not, you can blow some of the chips inside the computer. Once everything is physically in place, dial the computer you want to communicate with. If your modem autodials then just follow the manual's instructions and type in the appropriate phone number. If your modem does not autodial, then you have to make sure that your phone is either plugged into your modem or into the same Jack as your modem depending on which type of modem you have. Once you have dialled the computer and it has answered, you will hear a high pitch whistle. You then connect the modem by pressing a button or a switch.

Which Service?

So far we have said that you have to decide on what you want your software to do before obtaining your modem. To do that you have had to decide which computers you will want to access. We will now take a brief look at the main systems in Britain, namely Prestel, Compunet and Telecom Gold.

Prestel

This is British Telecom's viewdata system. It is in colour with graphics and a screenfull of data is displayed at a time. A screen of data is 22 columns high and 40 columns wide. Although British Telecom own the computers which store the information, the information is provided by various Information Providers (IPs). The IPs are numerous and vary immensely from the AA to the Zimbabwe Tourist Board. There are over 300,000 pages of information on almost every subject including Agriculture, Education, Banking, Microcomputing, Hobbies, Travel and Teleshopping.

Some of the IPs use Prestel as a gateway to their own computers, i.e. Prestel automatically connects you via a phone link to another computer. On Prestel there is the facility to receive and send mailboxes, receive and send telexes, to download software and to purchase certain items using your credit cards. You can even now use Prestel to access Telecom Gold! Prestel is not just a factual encyclopaedia; there are also many games available (including multi-user games) quizes and competitions.

Prestel is also cheap. 99% of all people in the UK have local call access. Even if you are abroad you can use PSS to access it. Computer connect time is only charged from 8am to 6pm Mondays to Fridays. At all other times it is free. Most pages are also provided free but some are charged for (city finance pages) but you are always notified in advance. The only other charge which you will come across, besides the Prestel subscription of £6 per quarter is the charge for various closed user groups (CUGS). Some CUGs are free, others are very expensive. The Prestel Microcomputing CUG is only £10 per quarter and this gives you access to literally thousands of pages. So for £16.00 per quarter, you have access to a magazine which is updated frequently and which consists of thousands of pages. Some interesting areas are also in the Prestel Microcomputing CUG even though they are not exactly Microcomputing, such as Amateur Radio in the ClubSpot area.

Micronet

The Prestel Microcomputing CUG is owned by a company called Micronet. Micronet is the biggest IP on Prestel which explains why they can produce so many lovely things. The advantage for newcomers who have not yet purchased a modem, is packages. These packages, usually £99 (although £129 for the Amiga) include a modem and software for accessing Prestel *plus* a year's subscription to Micronet and Prestel (which is worth £64). So for £35 you get a modem and software. These packages exist for the Commodore 64, 128, +4, Amiga and PC (as well as for other micros).

Compunet

As I've said before, only the CBM modem can be used to access this system. A subscription to Compunet can cost anything from £9 to £15 a quarter, depending on the type of account required. There are connect time charges but some of these can be dispensed with if you have a GOLD account (£15 per quarter). If you take out a quarter's Gold subscription plus post and packing of £3.50, a modem will be provided free of charge!

There is not local call access for everyone. So why use Compunet? Compunet does provide facilities that Prestel does not, e.g. you can buy items and have them charged to your Compunet account (which is something Prestel does not do). Compunet also has various IPs but not nearly so many as Prestel, but the information on the system is all geared to 64/128 users, but is not only to do with Microcomputing – there is also a hobbies section. Unlike Prestel where viewers cannot edit or upload pages unless they have access to the editing computer, Compunet users can upload pages into an area called the Jungle and without the need to use a

separate computer.

Compunet also has a useful editor which can be used both online and offline. It has many facilities and it is the way you print pages from Compunet. Compunet also has a duckshoot menu, so when you want to go into the editor for example, you move the cursor until it gets to editor and then press return. Prestel on the other hand is mainly operated by numbers which originates from the days when most terminals were not alphanumberic. Prestel has recently begun to use words called keywords, so instead of *8107# you can key *RSGB# or *ICPUG#. The main disadvantage with Compunet is that it is slow, but improvements are being in the system to speed it up.

Telecom Gold

This is a scrolling system in black and white. It is ideal for sending and receiving long documents or for searching special databases which are expensive (£1 a minute). Telexes are fairly cheap on Telecom Gold. There are however, connect charges at all times and these are expensive when compared with Prestel or Compunet. For example after 7pm in the evening, Telecom Gold's connect charges are three pence a minute, Prestel is free and Compunet is about 60 pence an hour (a penny a minute). However, no-one remains on Telecom Gold for long, it is not meant to be a system which you browse around, although various items of useful information and facilities are provided. Like Prestel it can be accessed by PSS.

Bulletin Boards vary considerably and either use scrolling or view data compatible software. One of the well-known viewdata compatible BBs is Databox, RSGB's bulletin board for Amateur Radio Hobbyists (Tel 0707 52242). Like most Bulletin Boards few phone lines are available which means that you may find it hard to get on to the system at popular times or of course the software can fall over!

Touchlines:
Compunet Teleservices Ltd, *Sheraton Business Centre, Wadsworth Road, Perivale, Middlesex UB6 7JB.* ***Tel:*** *01-965-8866.*
Y2 Computing Ltd, *111 St Albans Road, Watford, Herts WD2 4AE* ***Tel:*** *0923 50161.*
Prestel *page 60019918. They sell various communications software for most CBM machines.*
Tandata Marketing Ltd, *Albert Road North, Malvern, Worcs WR14 2TL.* ***Tel:*** *06845 68421 (Page 799 Prestel).*
Miracle Technology (UK) Ltd, *St Peters Street, Ipswich, Suffolk IP1 1XB.* ***Tel:*** *0473 216141.*
Micronet, *Durrant House, 8 Herbal Hill, London EC1R 5EJ.* ***Tel:*** *01-278 3143.*
Prestel. Tel: *01-822 1122 or Freephone Prestel Sales*
RSGB, *Lambda House, Cranborne Road, Potters Bar, Herts EN6 6JE.* ***Tel:*** *0707 59015.*

Freeze - A Jolly Good Fellow?

Freeze Machine is a combination of two of Evesham Micros utility programmes encapsulated within a single cartridge. Bringing together Freeze Frame MkV and Lazer MkII enables you to back up your programmes in a form which will reload in seconds rather than minutes.

By Eric Doyle

Freeze Frame is designed to produce backups of any program that you own, including commercial programmes. This obviously raises the question of copyright and piracy (or theft as I prefer to call it). Evesham Micros are well within their legal rights to produce utilities such as this and would say publicly that they do not condone program theft. By stamping the legend STRICTLY FOR PERSONAL USE across their instruction booklet, they absolve themselves of any uses which the purchasers of the cartridge may put it to. The misuser of the cartridge is the thief.

It's a bit like buying a gun. The purchaser is bound by the law not to fire the weapon in such a way as to cause personal injury to someone. That doesn't mean that shootings don't occur and when one does the legal process swings into action against the user, not the manufacturer. This analogy holds out quite well, but I feel I must point out that there is no such thing in Law as accidental copying!

To own a backup you should also have the original program, if you don't then how can you plead innocence? If you steal a program then it is not just the company producing that package that suffers but the programmer. *Your Commodore* in no way condones the theft of games but we cannot ignore the fact that fast backup copies are businesslike.

As a journalist the main application for my home micro is for word processing. I favour the Superscript package but it takes 2 minutes 24 sec to set it up the way I want it. Not a long time, but it's over two minutes of not earning cash! Could a fast load help me out? Yes, with Freeze Machine it takes about 20 seconds using the Lazer loader and 50 seconds without it. Over a year this could increase my take-home pay by over £100, more than enough to cover the cost of the cartridge, plus there are all the other programmes I use ready to be backed up.

"It's handy to be able to save and load all my development programmes at high speed and this is possible with Lazer"

The Lazer cartridge has two reset buttons, one brings in the Freeze facility and the other toggles between the fastload and Lazerload menus.

In trials I was not convinced that Lazer was necessary for two reasons. Firstly, the fastload facility was not significantly slower than Lazer but secondly, and far more importantly, the Lazer program file is stored as a locked USR file. This means that either the cartridge or a 'boot' program is necessary to load it and it always loads at turbo speed. The effect of this is that when your disk drive becomes slightly misaligned or varies in speed later in its life, all of your USR files will be useless until your drive is repaired. This can be a nuisance.

Turbo loaders are far more sensitive to speed variation than is the standard loading system. So a system which offers both alternatives is the belt and braces system for me. This means the fastloader in the Lazer cartridge.

Of course, backing up commercial programmes is just one use of the cartridge. For a programmer like myself it's handy to be able to save and load all my development programmes at high speed and this is possible with Lazer. I can also fast-format disks and use the DOS system to scratch and validate files. The only thing I miss is a built-in monitor which would be useful. I'm spoilt because I must admit to being the proud owner of Evesham Micro's miraculous Dolphin DOS system which makes Lazer look slow. Evesham claim a speed increase of over 20 times with Lazer but my tests using a standard C64 came nowhere near to this.

Inside the Lazer cartridge there is a very powerful utility set for your C64. It won't work with every piece of commercial software on the market but a large proportion of them *can* be backed up. At £28.95 it's a steal!

Touchline:

Evesham Micros: *63 Bridge Street, Evesham, Worcs WR11 4SF.* ***Tel:*** *(0386) 765500.*

Contributions

So you own a Commodore? So you've written some programs? So why haven't you sent them to us?

Your Commodore is always on the look out for new programs, hints and tips, articles and even regular series. In fact if you have something that you think could be of use to other Commodore owners we want to hear about it.

So if you have got something which you think we may be interested in. How do you go about submitting it to us?

Below you will find a list of guidelines that will help us to deal with any item that you send in to us. We don't expect everybody to be the next William Shakespeare but if you do follow these simple rules then it will make our job a lot easier.

1) If possible all material sent to the magazine should be typed or printed out on a computer printer.

2) All text should be double spaced i.e. there should be a blank line between each line of text. You should also leave a margin of about 10 characters around the text.

3) On the very first page you should put the following:
Name of the article
Machine that it is for
Any extras required – disk, printer etc.
Your name
Your address
Your telephone number

4) The top of every page should have the following information on it:
Abbreviation of the article title
Your name
The page number

For example, suppose you had submitted an article on C64 interrupts. You should put something like the following at the head of the page:

Interrupts/J.Smith/1

5) Please make sure that you do not make any additional marks on your text especially underlining.

6) Try and write in clear concise English, it does not have to be a work of literature but it must be comprehensible.

7) On the bottom of each page you should put the word MORE if there are more pages to the article or ENDS if it is the last page.

8) If possible, enclose a listing of all programs.

9) Under no circumstances use a staple to hold the pages together. Use a paperclip instead.

10) Programs should be included on either disk or tape. Make sure that you SAVE two copies of every program so that we have a better chance of loading them if problems occur.

11) Programs under 10 lines can be included in the text. If your program is longer than this you must enclose a disk or cassette.

12) If your article needs any artwork then supply clear examples of what is needed. We don't expect you to be an artist but we do need to see what is required.

13) Photographs, if necessary, must be either black and white prints or colour slides. We can take shots ourselves so don't worry about this too much.

14) Submissions of any length are welcome. If you have a five line routine that you think may be of use to someone else we welcome it just as much as a full blown six part series.

15) Payment varies quite a lot and depends on quite a number of factors, such as complexity of program, presentation of program, number of magazine pages it takes up etc. Payment is generally between £10.00 and £800.00.

16) All payments are made in the month that the magazine containing your article has appeared in print.

17) If we do find your submission suitable for inclusion in the magazine we will write to you giving the terms of publication, the rate of payment and an agreement form. Prompt return of this form will allow us to use your program as soon as possible.

18) If you want the program returning to you, should we find it unsuitable for publication, then you should enclose a stamped self addressed envelope.

19) The last and most important point to make is 'get writing', we are waiting for your articles.

must
nts or
s our-
is too

h are
outine
se to
ust as
eries.

nd de-
ctors,
gram,
per of
Pay-
0 and

n the
ining
t.

n
azine
ms of
and
rn of
your

urn-
able
ould
ssed

oint
ting



Using an Epson-type printer with the C64

The Epson-Type printer is probably put to best use when used in conjunction with a word-processing program such as Commodore's own Easy Script.

Interfacing a C64 to your printer can sometimes be a real chore. It is necessary initially to obtain an interface cable to connect the C64's user port to the printer's Centronics interface. This can be bought for about £20 (including some interfacing software) or can be made for about £8 if you are handy with a soldering iron (see separate panel). *No expensive interface cartridges are necessary*!

Connect the printer to the C64 and load up Easy Script. On the initial screen you should enter a '1' in printer type and a 'C' when you are prompted for interface type. From then on the printer responds normally and you may use a number of extra command characters to exploit the various modes of the printer. Some details are found on the Easy Script disk in the 'MX/FX info' file which you can print out.

Overcoming Problems in Basic

Listing BASIC programmes is a possible problem since Epson printers don't have the special Commodore cursor/colour control symbols. However, overcoming this is not too difficult – load and run the BASIC extension program supplied with November's *Your Commodore*, load the program to be listed, and use the CODE command to convert the listing into a readable format without special codes. Now open a file to disk or tape and list the program as follows:

```
Disk: OPEN 2,8,2"0:programname.
TXT,S,W" : CMD2 : LIST
Tape: OPEN 2,1,1,"Programname.
TXT" : CMD2 : LIST
```

This writes the program as a text file. If you now use Easy Script you should be able to load this file and print it as normal. This has the added advantage that your listing will have pagebreaks that don't print over the perforations. Also you can re-format the listing to indent FOR/NEXT loops, etc.

Without the Basic Extension

If you don't have the BASIC extension then don't worry, any special characters will usually appear in the listing as blank spaces. If you don't have a word processor then it is possible to use the interface software supplied with the cable. Or run this short program by P. Cornes which echoes all screen output to the Centronics printer (activated/de-activitated by SYS 49152:

```
10 FOR C  = 49152 to 49238 :
            READ B
20 POKE   C,B : NEXT C
30  DATA  162,0,142,1,221,202,142
40  DATA  3,221,173,2,221,9,4
50  DATA  141,2,221,173,0,221,9
60  DATA  4,141,0,221,173,38,3
70  DATA  174,85,192,141,85,192, 142
80  DATA  38,3,173,39,3,174,86
90  DATA  192,141,86,192,142,39,3
100 DATA  96,141,1,221,72,138,72
110 DATA  173,0,221,41,251,141,0
120 DATA  221,162,2,202,208,253,9
130 DATA  4,141,0,221,173,13,221
140 DATA  201,16,208,249,104,
          170,104
150 DATA  76,50,192
```



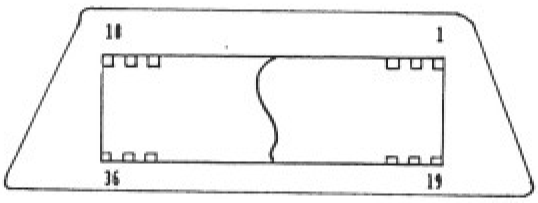
IMPLOSION
WHEN YOUR World is under ATTACK...
FIGHT BACK
Without doubt, the fastest multi-screen scrolling game ever. IMPLOSION will defy completion by even the most ardent game player.
8 levels of 360° scrolling action.
Dual play field.
Arcade style multi-colour graphics.
Arcade style multi-channel sound effects.
Conceived and created in association with Mindscape Inc.
COMMODORE 64 DISK....£14.95 COMMODORE 64 CASSETTE....£9.95
SPECTRUM 48/128 CASSETTE....£8.95
1-3 Haywra Crescent, Harrogate, HG1 5BG, England.
Tel: (0423) 525325 Telex: 265871 MONREF G Quoting 72:MAG31320
CASCADE GAMES LTD
Screen shots are taken from the C64 version.

Making a Centronics Cable

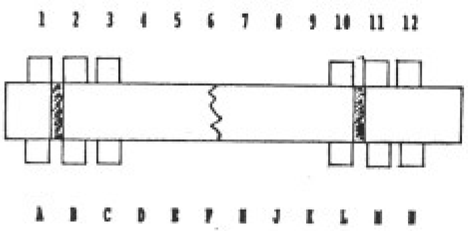
If you feel that you can tackle fairly fine soldering then you can make your own Centronics cable quite easily. You will require:

1 × Amphenol 36 way male Centronics plug for the printer end.
1 × Commodore 64 user port edge connector for the C64 end.
3m × 12 core shielded round cable.
(These should all be available from hobbyist electronic shops.)
The two plugs must be wired as follows:

Printer end



Computer end



PRINTER	C64
1	M
2	C
3	D
4	E
5	F
6	H
7	J
8	K
9	L
10	B
16	A

Please note: Making the lead longer than 3m is likely to cause problems (technically known as 'Skew errors').

Easy Script and Epson-type Printers

If you have successfully connected your C64 to an Epson-type printer you may find it helpful to know how to get all of the printer's special functions to operate from Easy Script. Some of the special characters required to operate an Epson printer are integral to Easy Script since Precision Software had Epsons in mind, when they designed the program.

These features are accessible by pressing<f1>and then one other key. Other functions must be sent to the printer as a row of characters, usually commencing with the *ESCAPE* character which is produced by pressing< f1> and then the up-arrow which then appears as a reverse 'E'. Escape and '4', for instance, selects italic printing.

Some functions require the use of other character codes which are not available from the keyboard such as the ASCII character whose code is 0. In order to use these it is necessary to predefine a special character for each code and assign that character the required decimal value.

Easy Script provides up to ten such special characters which can be used by pressing<f1>followed by one of the numbers 0 to 9. To define, say a character of ASCII value 65 to key 6 and a value of 67 to key 8 type a line in Easy Script as follows:
<f3>6=65:8=67<return>

Now pressing<f1>followed by a '6' should produce a reverse '6'. When printed this character will act as if it were ASCII 65 i.e. a capital 'A'. It is useful to define 0=0:1=1 since many functions use these ASCII values. Some other printer commands are produced by <f3> plus a short command.

Controls for Epson-Type Printer with Easy Script

Enhanced	<f1>/[and <f1>/]
Emphasised	<f1>/(and <f1>/)
Underlined	<f1>/; and <f1>/:
Double	<f1>/& and <f1>/%
Condensed	<f1>/< and <f1>/>
Superscript	<f1>/' each character.
Superscript on constant	esc 'S' 0 until
Superscript off	esc 'T'
Subscript	<f1>/, each character
Subscript on constant	esc 'S' 1 until
Subscript off	esc 'T'
ELITE	<f3>/pt10
PICA	<f3>/pt12
Italic	esc '4'
Italic off	esc '5'
Proportional on	esc 'p' 1
Proportional off	esc 'p' 0
NLQ on	esc 'x' 1

NLQ off	esc 'x' 0
Disable paper-end error	esc '8'
Enable paper-end error	esc '9'
Initialize printer	esc '@'
8 LPI line spacing	<f3>/lp8
6 LPI line spacing	<f3>/lp6
7/72" line spacing	esc '1'
Line spacing n/72"	esc 'A' n
Line spacing n/216"	esc '3' n
Standard density graphics	esc 'K' n_1 n_2
Double density graphics	esc 'L' n_1 n_2
D/d'sity D/speed graphics	esc 'Y' n_1 n_2
Quad density graphics	esc 'Z' n_1 n_2
Backspace	<f1>/<backarrow>

Most of these commands are self-explanatory, but a few need explanation. Backspace can be used to produce special characters by combining two others e.g. using = and / to produce ≠. First type '=' then <f1> backarrow then '/'. This will produce the new symbol.

Producing single graphic characters is done in a similar way to user-defined graphics on the C64. The characters are designed on a grid 8 dots high by up to 65535 dots wide. Suppose we want to define a lower case Greek DELTA:

First we design:

0	0	*	*	*	0	0	×	128
0	*	0	0	0	*	0	×	64
0	0	*	0	0	0	0	×	32
0	*	*	*	0	0	0	×	16
*	0	0	0	*	0	0	×	8
*	0	0	0	*	0	0	×	4
0	*	*	*	0	0	0	×	2
0	0	0	0	0	0	0	×	1
---	---	--	---	--	---	---		
12	82	178	146	140	64	0		

Note that it requires 7 ASCII numbers to define this character. 7 in Low byte/High byte format is 7 and 0 (i.e. (1×7) + (0×256) = 7).

Now we define the ASCII characters for each column, plus two for the numbers of columns to be used:

<f3>0=0:1=1:2=7:3=12:4=82:5=178:6=146:7=140:8=64

To produce the delta in single density graphics we now type:

<esc>K<f1>2<f1>0<f1>3<f1>4<f1>5<f1>6<f1>7<f1>8<f1>0

To produce the delta in double density graphics we must have double the number of columns so we define:

<f3>2=14

and type:

<esc>L<f1>2<f1>0<f1>3<f1>3<f1>4<f1>4<f1>5<f1>5<f1>6<f1>6<f1>7<f1>7<f1>8<f1>8<f1>0<f1>0

The same principle holds for quad density graphics.

One final trick – micro-lettering ! This is achieved by using subscripts (which are half-height) with condensed mode characters and also reducing the line feed to about half the normal distance.

Select Condensed mode by using <f1>'<'.

Select Subscript by using esc'S'<f1>'0'.

Choose a line spacing of about 14/72" and therefore define <f1>9 as 14 by: <f3>9=14 return

Select 14/72" linespacing by using esc'A'<f1 '9'.

The result, as you can see, is completely tiny. Goodbye and enjoy writing your letters...

Shadow Boxing

Use the shadowy area of your computer's memory to improve your Basic storage space.

By Rick Astley

A rather back-handed compliment that may be paid to the C64 is that it has encouraged many a programmer to learn machine code, the reason being that its space-saving Basic is rather slow for some types of program.

However, there are programmers who do not necessarily agree that a move to machine code is a progressive step. To meet these programmers' needs, many machine code routines have been written which augment the C64's Basic. The following describes three more.

The programs have been written in recognition that the 64's 40K of Basic bytes can be severely drained by the need to store data. This data may represent numerical or text information, sprites or perhaps screen data and associated colour memory. The 4K of memory from 49152 to 453247, whilst easy to address, is nevertheless rather limited. The programs we are to meet here, known by mnemonics MEX, MAVE and SYSSY, make the 8K RAM, hidden in the shadow of the Basic interpreter, much more accessable in Basic.

The shadow memory refered to, between 40960 and 49151 and known as LORAM, is actually perfectly simple to POKE to in the normal way. The C64 knows that it is futile to try to write to ROM, and so responds to any attempt to do so by switching the ROM out and the RAM in to receive the POKE. The Catch 22 with LORAM is that in order to PEEK it, you need to switch the ROM out; however, this ROM is the Basic interpreter and with it switched out, the PEEK instruction cannot be understood.

The answer is to utilise a short machine code program which can access the Shadow RAM. The program here is called MEX, short for Memory Exchange. MEX will exchange any nominated segment of memory for any other of identical size. If a chosen area includes that from 40960 to 49151, then LORAM will be exchanged. This allows the Basic programmer to LOAD or POKE data to LORAM (sprite data perhaps or a screen), and when required, call MEX and swap it for similar data which is not required for the moment, and which is in memory-accessable to Basic. No data is lost; calling MEX again will re-exchange each byte back to its original place, or to some other position if you change the parameters.

Before using MEX it is necessary to decide on three pieces of information: the number of 256-byte blocks to be exchanged and the two addresses from which they are to start.

As an example, suppose you wished to swap the 8k bytes from 32768 to 40959 for that in LORAM from 40960 to 49151 inclusive. First, remember that the area 32768 to 40950 should have been protected from being over-written by Basic if you want to use it for data storage. Do this by POKEing location 52, the bottom of string storage, and 56, the highest address used by Basic, with 128 (because 32768/256=128) before RUNing any programs. The size of the memories to be exchanged is 8k, which equates to 8*1024 or 8192, so the number of 256 byte blocks involved is 8182/256, which is 32.

Your program line may look something like this:

```
5 POKE 52,128: POKE 56,128:
  SYS50000,32768,40960,32
```

MEX is wholly portable and, although it has been put at 50000, and is called by SYS 50000, it may move to wherever you wish by changing line 10 of the basic loader, and modifying the SYS command accordingly.

Saving from Memory

MAVE is the Memory, SAVE program. Unlike MEX, which is RUN from within your program, MAVE uses a small amount of your memory but is not needed within the program. However like the other two programs it may be moved to any convenient area in the manner explained later. If using a disk drive, the cassette buffer is available to you and in this case

MAVE is outside your main program/data area.

MAVE is called by the immediate command:
SYS 50075,SA,EA,"PN",DN
where: SA is the start address (usually 0801); EA is your end address + 1; PN is your program name; DN is the saving device number (1 for cassette or normally 8 for disk).

PROGRAM: SHADOW

```
54  10 X-50000:Y-0
DB  20 READ A:IF A - -1 THEN 40
67  30 Y=Y+A:POKEX,A:X=X+1:GOTO
    20
93  40 IF Y-25639 THEN PRINT "OK
    ":END
32  50 PRINT"CHECK SUM -";Y; "BU
    T SHOULD BE 25639"
31  60 PRINT"DIFFERENCE - ";Y-25
    639
D5  100 DATA32,253,174,32,138,17
    3,32
35  110 DATA247,183,165,20,133,2
    51,165
0E  120 DATA21,133,252,32,253,17
    4,32
7E  130 DATA138,173,32,247,183,1
    65,20
F4  140 DATA133,253,165,21,133,2
    54,32
26  150 DATA241,183,134,255,165,
    1,41
58  160 DATA254,133,1,177,251,17
    0,177
7D  170 DATA253,145,251,138,145,
    253,200
DF  180 DATA208,243,198,255,240,
    6,230
39  190 DATA252,230,254,208,233,
    165,1
C5  200 DATA9,1,133,1,96,162,4
9D  210 DATA181,42,149,250,202,2
    08,249
3D  220 DATA32,253,174,32,138,17
    3,32
86  230 DATA247,183,165,20,133,4
    3,165
B9  240 DATA21,133,44,32,253,174
    ,32
36  250 DATA138,173,32,247,183,1
    65,20
05  260 DATA133,45,165,21,133,46
    ,32
08  270 DATA253,174,32,212,225,1
    65,1
29  280 DATA41,254,133,1,166,45,
    164
3B  290 DATA46,169,43,32,216,255
    ,165
AE  300 DATA1,9,1,133,1,162,4
9B  310 DATA181,250,149,42,202,2
    08,249
67  320 DATA96,162,6,181,44,157,
    51
BD  330 DATA3,202,208,248,134,10
    ,32
9A  340 DATA212,225,165,10,166,4
    3,164
F0  350 DATA44,32,213,255,162,6,
    189
5D  360 DATA51,3,149,44,202,208,
    248
BB  370 DATA96,0,-1
```

Where MAVE differs from other SAVE utilities is that, should you have data stored in LORAM, then it will save this, rather than the Basic interpreter ROM.

Overcoming LOAD Problems

Unfortunately, there is a disadvantage to using a cassette when LOADing to LORAM. The C64 loading system will LOAD your data into LORAM, but this data is recorded twice on your tape, and at the second pass the system compares the tape data with that supposedly LOADed on the first pass. This is normally a good check for LOAD errors, but when loading to LORAM the check is made, not against the contents of that area, but against the ROM above it. The result is an error message which you can ignore in immediate mode, but which stops a program if the LOAD is made from within it.

LOADing data into high memory from disk can also be a source of annoyance, but this time, the difficulty occurs in immediate mode rather than from within programmes. The problem reveals itself as an out of memory error, the system assuming that because the last data was high in memory, everything below it is full.

SYSSY overcomes both these quirks. SYSSY starts 155 bytes after MEX and so, if you keep the basic loader start at 50000 and then make the variable SY equal to 50155, you call it as follows:

SYSSY,"NAME", 1,1
for tape or
SYSSY,"NAME", 8,1
for disk.

MEX, MAVE and SYSSY have been kept quite simple, using many routines already resident in the 64, so that they will not take hours to type in via the single Basic loader SHADOW. Nevertheless, it is worth testing them, and practicing their use with the short Basic programmes listed here called SCREEN TEST 1 and SCREEN TEST 2.

Testing

First LOAD and RUN SHADOW and, if the computer responds with "OK", delete the Basic loader with NEW. Next type in SCREEN TEST which operates as follows:-

Line 5 sets the character colours. This line is required only on older C64s. If POKE 1024,160 on a freshly switched-on computer does not produce a square in the top left hand corner, you will need this line.

Line 10 sets the variable MEX to the start address of the program;
Line 20 draws a series of vertical lines onto the screen;
Lines 30 through 60 draw a similar set of horizontal lines in LORAM;
Line 70: the SYS command directs the program to the routine MEX, the memories to be exchanged to start at 1024, (the screen) and 40960, (the start of LORAM), and the amount of memory involved to be 4 blocks of 256 bytes which equates to 1024, exactly one screen's worth of data;
Line 80 ensures that the exchange occurs whilst the flying spot, which traces your T.V. picture, is off the screen;
Line 90 loops back to re-exchange the data.

SAVE and RUN SCREEN TEST. Note how slowly the vertical lines are drawn in Basic and wait a little longer for the horizontal lines to be drawn in LORAM. As soon as MEX is called, however, the speed of the machine code program is immediately evident, as it alternately exchanges the vertical and horizontal lines from screen to LORAM. In fact, the speed of interchange produces a chequered pattern which is even more apparent if line 80 is deleted.

Now press RUN/STOP and SAVE the pattern in LORAM with:
SYS50075,40960,41984,"PATTERN" 1
If using disk, then the last digit should be set to 8. As with standard SAVE routines you may add a final ,1 as a secondary address to ensure that the pattern LOADs back to the memory from which it was SAVEd. This can also be achieved by adding,1 when LOADing.

Now modify SCREEN TEST 1 to make program called SCREEN TEST 2. In the new program:
Line 1 is simply an aid to memory;
Line 10 ensures the program RUNs from line 20 after LOADing "PATTERN";
Line 15 has to be added. SYSSY calls the LOAD routine, and is actually SYS SY where SY = 50155;
Lines 20 to 50 are modified so as to draw a diagonal pattern, which

contrasts with the horizontal or vertical lines, whichever were LOADed with "PATTERN",

Line 60 is no longer used, and should be deleted;

Lines 70 to 90 remain unchanged.

When it is RUN, SCREEN TEST 2 should first LOAD the SAVEd "PATTERN" without the error message which would normally occur from a tape LOAD into LORAM.

Next the diagonal pattern will be drawn, after which MEX starts swapping the pattern LOADed into LORAM with the diagonals drawn by lines 20 to 50.

In the above exercise, MEX, MAVE, and SYSSY have all been used. Each, however, may be loaded elsewhere in memory, either independently, or as a single program. To do this, change line 10 of the Basic loader. Once loaded, MAVE can be used to SAVE each one as a machine code program, as was done with "PATTERN".

Note the position of each program when loaded using SHADOW:

MEX runs from 50000 to 50074;
MAVE from 50075 to 50154;
SYSSY from 50155 to 50190.

The ability to use LORAM gives the Basic programmer continuous RAM from 2048 to 53247, save for the 190 bytes used to store the utilities described here. Used effectively, more elaborate Basic programmes can be produced, hopefully compensating for that oh-so-evident lack of speed.

PROGRAM: SCREEN TEST1

```
70   1 REM SCREEN TEST
EF   5 POKE 53281,14:PRINT CHR$(1
     47):POKE 53281,6
33   10 MEX=50000
EB   20 FOR X=1024 TO 2023 STEP 2
     :POKE X,32:POKE X+1,160:NEXT

B5   30 FORX=40960 TO 41920 STEP
     80
C5   40 FORY=0 TO 39:POKE X+Y,32:
     NEXT
D1   50 FORY=40 TO 79:POKE X+Y,16
     0:NEXT
BE   60 NEXT
C4   70 SYS MEX,1024,40960,4
F9   80 WAIT 53265,128:WAIT 53265
     ,128,128
F4   90 GOTO 70
```

PROGRAM: SCREEN TEST2

```
70   1 REM SCREEN TEST
EF   5 POKE 53281,14:PRINT CHR$(1
     47):POKE 53281,6
DF   10 MEX=50000:SY=MEX+155:F=F+
     1:IF F = 2 THEN 20
D4   15 SYSSY "PATTERN",8,1
12   20 FOR X=1024 TO 1943 STEP 8
     0
6B   30 FOR Y=0 TO 39 STEP 2:POKE
      X+Y,95:POKE X+Y+1,223:NEXT
CB   40 FOR Y=40 TO 79 STEP 2:POK
     E X+Y,223:POKE X+Y+1,95:NEXT

B0   50 NEXT
C4   70 SYS MEX,1024,40960,4
F9   80 WAIT 53265,128:WAIT 53265
     ,128,128
F4   90 GOTO 70
```

LIFESAVERS 6	C64, C128, C16, PLUS/4	MESSAGE SCROLLER	1/1

How often have you wanted to put a scrolling message across your screen?

Presented here is a short Basic routine that will enable you to place a scrolling message anywhere on your screen with ease.

The routine requires that the message to be scrolled is held in the variable A$. The delay between printing each character should be assigned to DEL. The width of the message is held in variable WD and the positioning of the string is held in D$.

The positioning of the string is done by placing a HOME and a number of cursor downs and lefts in the string.

Note A$ and D$ should not exceed 255 characters in length or a string too long error will occur.

Alexander Chambers
Brislington

```
1000 REM ********************
1010 REM * MESSAGE SCROLLER *
1020 REM ********************
1030 A$="[WHITE]THIS IS AN EXAMP
LE OF THE MESSAGE SCROLLER FOR '
YOUR COMMODORE'"
1040 DEL=40:WD=20
1050 D$="[HOME,DOWN12,RIGHT10]"
1060 PRINT"[CLR]"
1070 L$="[RIGHT4]":A$=L$+L$+L$+L
$+A$+" "
1080 FORI=1 TO LEN(A$)
1090 PRINT D$;MID$(A$,I,WD);CHR$
(145)
1100 FORJ=1 TO DEL:NEXT J,I
1110 GOTO1070
```

TOTAL BACK-UP POWER CBM 64/128

PERIPHERALS..THE FINAL FRONTIER..OUR MISSION..TO BOLDLY GO WHERE NO OTHER UTILITIES HAVE GONE BEFORE

CAPTAIN'S LOG...THE TOTAL SOLUTION TO ALL YOUR BACK-UP NEEDS... THE ULTIMATE BACK-UP CARTRIDGE HERE NOW !!

REPORT ON FINDINGS

Action Replay Mk III is more powerful, more friendly and will back up more programs than any competing utility by taking a 'Snapshot' of the program in memory so it doesn't matter how it was loaded... from disk or tape, at normal or turbo speeds... the results are the same – **Perfect!! Amazing!!!**

STARBASE UPDATE

- Simple to use: just press the button and make a complete backup: Tape to Tape, Tape to Disk, Disk to Disk, Disk to Tape. – THE PROCESS IS AUTOMATIC – JUST GIVE THE BACKUP A NAME.
- All backups will reload at turbo speed independently of the cartridge.
- Dual speed tape turbo system. Programs can load up to 3 times faster than commercial turbos – that's over 10 times normal Commodore speed.
- Freeze the action then view the program with the monitor feature. Add pokes for infinite lives etc. Then restart the game or backup – ideal for customised versions of your games.
- Picture Save. Save any multi-colour. Hires screen to disk or tape. Compatible with Blazing Paddles, Koala, Slideshow etc.
- Fully compatible with 1541, 1541C, 1570, 1571, and enhancer or any CBM compatible data recorder.
- For C64, 64C, 128, 128D (in 64 mode).
- Unique Sprite Monitor. Freeze the Action and view all the Sprites, watch the animations scroll across the screen. Save Sprites to disk or tape. Customise your games by loading sprites from one game to another – then restart the program or make a backup.
- Compatible with fast DOS and Turbo ROM systems.
- Backup process in turbo speed – faster than any rivals.
- Special compacting techniques. Each program is saved as a single file.
- Transfers multistage tape programs to disk – more than any other cartridge – even the extra stages are turbo load – a unique feature.
- Sprite Killer! make yourself indestructible by disabling Sprite collisions in games.
- Fast disk format (20 secs).
- Built-in unstoppable reset button.



PLUS Built In FASTLOADER

Action Replay III even has a built in disk fast loader which speeds up loading 5 times. Uses no memory – invisible to the system. You could pay £20 alone for this feature.

WARP 25 BREAKS THROUGH THE 10 SECOND BARRIER!

Action Replay III now comes with an amazing new Disk Bootloader that will reload your backups at TWENTY FIVE TIMES normal speed. The fastest disk turbo yet devised!! There are NO CATCHES. WARP*25 works with ALL your games. Works with any disk drive. No preload required – No hardware modifications necessary – No user knowledge required – programs load INDEPENDENTLY. LOADING TIME – 9.8 SECONDS (for a typical game saved by WARP*25 in conjunction with ACTION REPLAY III). This time is for the COMPLETE load process from start to finish. Reload is entirely INDEPENDENT of the cartridge or any other hardware.

Compare these (accurate!) figures for some rival backup systems:

SYSTEM	LOAD TIME	PROGRAMS PER DISK	CARTRIDGE REQUIRED?
ACTION REPLAY MK III SAVED WITH NORMAL TURBO	25 SECS	THREE	NO
ACTION REPLAY MK III SAVED WITH WARP • 25	9.8 SECS	THREE	NO
FREEZE FRAME (MK IV)	40 SECS	TWO OR THREE	NO
FREEZE FRAME (LAZER)	25 SECS	TWO	YES
EXPERT SYSTEM	30 SECS	THREE	NO

All purchasers of Action Replay III will receive WARP*25 FREE with their cartridge. Existing Action Replay III owners can obtain WARP*25 Disk turbo by sending £2.50. post free. (No need to send your cartridge). OR obtain it FREE on the Enhancement Disk (£7.95).

THE ACTION REPLAY ENHANCEMENT DISK

The best collection of tape to disk transfer routines for nonstandard multiload programs (eg Dragons Lair I and II, Championship Wrestling, Summer Games. Ace of Aces, Gauntlet, Supercycle, Marble Madness, World Games). 31 titles in all. Uses our unique parameter system. No user knowledge required. Turboload throughout. NOTE: Standard cartridge transfers normal multiloaders eg Winter Games etc. etc. Disk includes file copy and disk backup utilities.

PRICE £7.95 with FREE! Multicolour Slideshow for display of loading screens, hires pictures etc. saved by Action Replay. Great entertainment!

PERFORMANCE GUARANTEE

100% Success? Rival Claims? Who's Kidding Who?

Action Replay Mk III will backup any program which any other cartridge can backup – and more! It also has an unmatchable range of features. Consider 'Freeze-Frame' for example, which uses more disk space, saves at slower speed, has slower tape loader, has no built in disk fastloader, no picture, Sprite or restart features and costs £10 more than Action Replay. So who's kidding who? Buy Action Replay Mk III. If you find that it does not live up to our claims return it within 7 days of receipt and your money will be refunded.

USUALLY SAMEDAY DESPATCH ON ALL ORDERS.

datel electronics

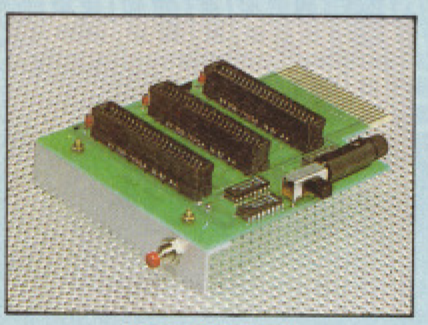
Send cheques/postal orders to:
DATEL ELECTRONICS, UNIT 8/9 DEWSBURY ROAD, FENTON INDUSTRIAL ESTATE, STOKE-ON-TRENT. TEL: 0782 273815 TELEX: 367257 TELSER G.

SEE OUR DOUBLE PAGE ADVERTISEMENT ELSEWHERE IN THIS MAGAZINE FOR OUR FULL RANGE OF COMMODORE ADD ONS. SEE US ON PRESTEL PAGE No 258880000A 12 PAGE CATALOGUE + ORDER PAGE.

VISA

CALL 24HR CREDIT CARD LINE
0782 273815

DATEL ELECTRONICS



3 SLOT MOTHERBOARD

Save wear and tear on your Expansion Port

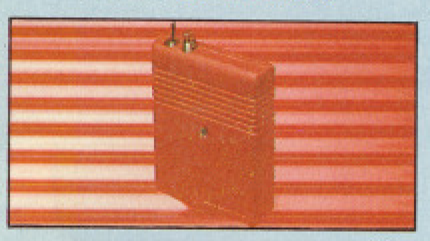
- Accepts 3 cartridges.
- Onboard safety fuse.
- Switch in/out any slot.
- High grade PCB.
- Fully buffered.
- Reset button.

ONLY £16.99

DATA RECORDER

- Quality Commodore compatible data recorder.
- Pause control.
- Suitable for 64/128.
- Counter.
- Send now for quick delivery.

ONLY £24.99



SMART CART ™

Now you can have an 8K or 32K cartridge that you program like RAM then acts like ROM!

- 8K or 32K pseudo ROM.
- Battery backed to last up to 5 years (lithium battery).
- Simply load the program you require – then flick the switch. The cartridge can then be removed just like a ROM cartridge.
- Make your own cartridges including autostart types – without an EPROM burner.
- Can be switched on or off board via software.
- I/O 2 slot open for special programming techniques.
- 32K version has 4 x 8K pages.
- Some knowledge of M/C is helpful – but full instruction are provided.

8K VERSION £14.99
32K VERSION £29.99

SMARTCART UTILITIES

A series of utility programs for use with Smartcart. Simply load in the program and you have a powerful cartridge. When you have a different requirement – load in another program and you have a new cartridge. The process takes seconds, and can be repeated any number of times.

We intend to release a range of programs. The first available are:

DISKMATE II

- all the features of Diskmate II (see ad).

Loaded in seconds – with full instructions. **ONLY £9.99**



PRINTER IV

Now you can turn your MPS 801 into 4 printers in one!!

- Alternative character set ROM – fitted in seconds.
- All four sets have true descenders.
- 100% compatible with all software.
- Descender.
- Eclipse.
- Scribe.
- Future.
- Choose any set at the flick of a switch.

"For anyone who uses their printer often this chip is a must. It's quick and easy to use and the end results are impressive" – Your Commodore, Jan 87.

ONLY £19.99

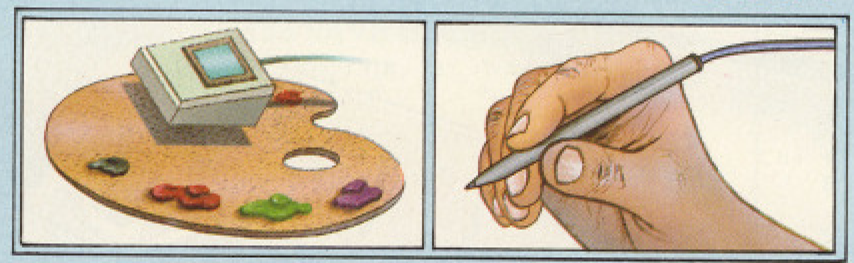


TURBO ROM II

Turbo Rom II is a replacement for the actual kernal inside your 64. It provides superfast load/save routines.

- Loads most programs at 5-6 times normal speed.
- Saves at 5-6 times normal.
- Improved DOS support including 10 sec format.
- Programmed function keys:- load, directory, old, etc.
- Return to normal kernal at flick of a switch.
- FCOPY – 250 block file copier.
- FLOAD – special I/O loader.
- Plus lots more.
- Fitted in minutes – no soldering usually required. (On some 64's the old ROM may have to be desoldered).

ONLY £14.99



BLAZING PADDLES

A complete lightpen/graphics illustrator package.

- A fully icon/menu driven graphics package of a calibre which should cost much more.
- Complete with a fibre optical lightpen system for pin point accuracy.
- Multi feature software including:
  - ● Range of brushes ● Airbrush ● Rectangle ● Circle ● Rubberbanding ● Lines ● Freehand ● Zoom mode ● Printer dump ● Load/save ● Advanced colour mixing – over 200 hues!!
  - ● Cut and paste allows shapes/windows/pictures to be saved to/from tape/disk.
- Blazing Paddles will also work with many other input devices including; Joysticks, Mice, Graphics Tablets, Trackball etc.
- Pictures can be saved from Action Replay and edited with Blazing Paddles.

Complete Blazing Paddles & Lightpen **ONLY £24.99**

Blazing Paddles available separately for **£12.99**

TOOLKIT IV

The ultimate disk toolkit for the 1540/1541

- A disk toolkit is an absolute must for the serious disk hacker. Toolkit IV has more features than most for less.
- DISK DOCTOR V2 – Read and write any track and sector including extra and renumbered tracks. Repair damaged sectors. Look underneath read errors.
- HEADER/GAP EDITOR – Decodes and displays ALL header information including off bytes and header gap. Rewrite the entire header and header gap. Renumber sectors. Also edit any sector tail gap.
- DISK LOOK – Sort directory. Recover lost files. Display file start/end addresses. Disassemble any file program directly from the disk to SCREEN or PRINTER including undocumented opcodes. Edit Bam. Much, much more.
- FILE COMPACTOR – Can compact machine programs by up to 50%. Saves disk space. Compacted programs run as normal.
- FAST DISK COPY – Copy an entire disk in 2 minutes or less using single 1541.
- FAST FILE COPY – Selective file copy. Works at up to 6 times normal speed.
- FORMATTER – 10 second format an entire disk or format any individual track or half track 0 to 41. Redefine any of 30 parameters to create or recreate unique disk formats.
- ERROR EDIT – Quickly find and recreate all read errors including extra and renumbered tracks or sectors and half tracks from 0 to 41. Even recreates data under errors and allows you to redefine any necessary parameters.

ONLY £9.99

RAM DISK

- Turn your Smart Cart into a 32K RAM/disk.
- 32K of instant storage area for files/programs.
- Load/save instantly.
- Disk type commands: load, save, directory, scratch.
- Program data retained when computer is switched off!
- Full command set with instructions.

ONLY £9.99

ROBOTEK 64

Model & Robot Control made easy

- Robotek 64 is a comprehensive hardware/software package which enables you to connect your 64/128 to the outside world.
- 4 output channels – each with onboard relay
- 4 input channels – each fully buffered TTL level sensing.
- Analogue input with full 8 bit conversion.
- Voice input for voice control.
- Software features:- test mode/analogue measurement/voice activate/digital readout etc.
- Excellent value! **ONLY £39.99**

including hardware/software/mic etc. (State tape or disk)



DIGITAL SOUND SAMPLER

- The new sampler allows you to record any sound digitally into memory and then replay it with astounding effects.
- Playback forwards/backwards with echo/reverb/ring modulation etc.
- Now with full sound editing module to produce outstanding effects.
- Full 8 bit D to A and ADC conversion.
- MIDI compatible with suitable interface. (I.e. Datel unit for £29.99, see ad).
- Live effects menu includes real time display of waveforms.
- Line in/mic in/line out/feedback controls.
- Powerful sequencer with editing features.
- Load/save sample.
- Up to 8 samples in memory at one time.
- Tape or disk (please state).
- Complete software/hardware package **£49.99**
- Com-Drum software is available separately at **£9.99** to turn your Sampler II into a Com-Drum system as well as a sampling system.



COM-DRUM

Digital Drum System

- Now you can turn your computer into a digital drum system.
- Hardware/software package.
- 8 digital drum sounds in memory at one time.
- Complete with 3 drum kits.
- Real drum sounds – not synthesised.
- Create superb drum rhythms with real and step time.
- Full editing.
- Menu driven.
- Output to hi-fi or through tv speaker.
- Load/save facilities.

ONLY £29.99 (state tape or disk)

COM-DRUM EDITOR

- 24 drum sounds supplied on disk to enable you to construct your own drum kit.
- Re-arrange sounds supplied with a Com-Drum to make new kits.
- With sound sampler hardware you can record your own kits.
- Load/save facilities.

ONLY £4.99 disk only

Code Comfort

York Electronic Research is a small company specialising in hardware and software utilities which are worthy of more attention. The latest releases include a 6502 assembler and a Z80 compiler for the C64.

By Eric Doyle

The 6502 Assembler from York Electronic Research (YER) is a no frills two-pass assembler which eases the problems of coding considerably by allowing labels to be used. This means that subroutines can be called by giving them a name of your choosing and variables used within the routine can also be named. It's easier to explain this by example.

Let's use a short routine for clearing four lines of the C64 screen in conventional mnemonic form:

```
C000  LDY #$28
C002  LDA #$20
C004  STA$03FF,Y
C007  STA$0427,Y
C00A  STA$44F,Y
C00D  STA$0477,Y
C010  DEY
C011  BNE$C004
C013  RTS
```

In YER assembly code this becomes:

```
0001  ORG 49152; decimal for $C000
0002  SPACE=32
0003  SCREEN=1024
0004  WIDTH=40
0005  ;ROUTINE STARTS HERE
0006  LDY # WIDTH
0007  LDA # SPACE
0008  CLEAR: STA SCREEN-1,Y
0009  STA SCREEN+39,Y
0010  STA SCREEN=79,Y
0011  STA SCREEN+119,Y
0012  DEY
0013  BNE CLEAR
0014  RTS
```

As you can see the purpose of the routine is much clearer and the facility to include REM style statements following a semi-colon adds to the clarity. The main advantage is that jump and branch calls rely on a label, not a finite memory location. This means that adding a line within the program automatically adjusts the calls accordingly on assembly of the final code. Relocation is also easier. By simply changing the ORG address, the assembler will then use this as the base address for all jumps and branches.

Although I've said that YER's assembler is lacking in frills this has the advantage of leaving 39K of memory free for program workspace. Add to this the fact that programmes can be chained onto one another and you soon see the power that this utility conceals.

There are only fourteen editor commands:

A - assemble current source text
B - return to Basic
C - verify a saved file
D - delete lines
E - edit a line
G - get a file from tape/disk
H - hunt text for a string
I - insert new lines in text
L - list a line, set L
N - clear memory (new)
O - recover text (old)
P - save text to tape/disk
S - define output device
V - list text to screen

Some kind of DOS to call up disk directories and scratch unwanted files would have been a sensible addition, but this would be at the cost of assembler program space. At least you can always switch back and forth from program control to Basic without disturbing your assembler code.

Within the actual assembler listing the normal mnemonic codes work as expected but there are ten directives to assist program writing:

LOF
LON
CHN
BEG

```
1000 ;*** HIRES PLOTTING ROUTINE ***
1010 ;      *** X=BC Y=DE ***
1020 ;
1030 *=$0924
1040 :HSCR=8192
1050 ;
1060 ;*** SWITCH ON HIRES AT 8192 ***
1070 ;*** THEN CLEAR HIRES SCREEN ***
1080 ;*** AND SET NORMAL SCREEN UP***
1090 ;
1100 LD A,%00000001    ;BLACK ON WHITE
1110 LD (1024),A
1120 LD HL,1024
1130 LD DE,1025
1140 LD BC,1000
1150 LDIR
1160 ;
1170 LD A,1            ;BORDER WHITE
1180 LD (53280),A
1190 ;
1200 LD A,(53272)   ;HIRES SCREEN=8192
1210 OR 8
1220 LD (53272),A
1230 ;
1240 LD A,(53265)           ;HIRES ON
```

DBY
DWO
SPC
POK
ORG
AUT

At assembler code generation time LOF and LON simply suppress or enable the listing of the assembled code to go to the monitor screen. As printing to the screen takes time, a significant increase in assembly time can be gained by suppressing the screen display of the code when the assembly option (A) is employed.

CHN and BEG always appear at the end of programmes when several listings are chained together. CHN tells the assembler to load the next part of the chain during assembly, and BEG is used at the end of the final part of the chain so that the second pass can be initiated from the first part program of the assembled chain.

The reason the chain has to be loaded twice is that the first pass sorts out the labels and their related actual address in the assembled code. The second pass is to insert these finite addresses into the code as it assembles.

DBY and DWO are used when look up tables are inserted into a listing.DBY stands for Define BYtes and anything following this command will be stored as a memory byte or string of bytes. For example:

DBY 147, "READY"

This would store the clear screen (147) value as the first byte followed by each value for the word READY in the following five memory locations.

DWO is followed by a series of lable names used in the program. At assembly time the program stores the high and low bytes of the memory locations of the label as a look-up table.

SPC is followed by a number which allows a gap of up to 256 bytes to be placed within a program to leave space for variables and arrays.

At assembly time you have two options. The code can either be poked directly to its final address or stored as a basic booted relocator program.

The straightforward memory assembly is directed to the start address by the POK command. In our screen clearing routine POK 49152 would cause the assembler to try to poke the code directly into memory. In this case a clash with the storage area of the actual assembler program would cause an OUT OF MEMORY message to be generated forcing the use of the second assembly method.

ORG assembles the program in the low basic programming area preceded by a routine which will move the block of code to its actual execution address when RUN is entered. The AUT command can also be used for force the boot program to jump to the new code without having to enter a SYS command.

On the whole the assembler works well but correction of a bad line is a long-winded affair. If an error has been entered in line 0006 of the program, the correction routine would look like this:

L6 list correction line
0006 LDM # WIDTH
D1 delete that one line
I insert a line
0006 LDY # WIDTH

The instructions are good but the area of saving assembled code is not covered in sufficient detail. There is no way within the program to save the assembled code so a return to Basic must be made and a save can then be made using the normal SAVE command. None of this gets a mention which could confuse a beginner, and it took me a while to work it out for myself.

```
0208 ;
0209 NEWLIN:JSR CHROUT ;PRINT CR
0210 LDA BUFFER ;COMMAND
0211 CMP #13
0212 BEQ PROMPT
0213 LDY #13
0214 LOOP0:CMP COMMS,Y
0215 BEQ EXEC
0216 DEY
0217 BPL LOOP0
0218 ;
0219 LDY #0
0220 ELOOP:LDA ERROR,Y
0221 JSR CHROUT
0222 INY
0223 CPY #18
0224 BNE ELOOP
0225 BEQ PROMPT
0226 ;
0227 ERROR:DBY "?NO SUCH COMMAND",13,13
0228 COMMS:DBY "PGCLUIDHNEABOS"
0229 TITLE:DBY 147,"EDITOR/ASSEMBLER V2.
0 (C) Y.E.R. 1986",13,0
0230 JUMPS:DWO PUT ;JUMP TABLE
>
```

Nevertheless the York Electronics Research Assembler is one that I would recommend for someone making their entry into machine code programming. All of the essential features are included within the program, and there are not enough commands to confuse a novice.

The Z80 Emulator

The second of YER's products is the Z80 Emulator. Before going any further I would just like to say that this is purely an educational aid. There is little possibility of transporting the code directly across to a Spectrum or Amstrad machine. This is an *emulator* not a simulator.

For a loing time after mastering 6502 machine code I wanted to try Z80 code, but I was inhibited by the fact that I'd have to buy another computer to do so. If only this emulator had been available then I would not have had to shell out a fortune on a machine I don't really need.

The YER emulator is really a compiler which takes each Z80 command and translates it into a corresponding piece of 6502 code from a library stored on disk. It's a bit like Basic really in the sense the interpreter takes the Basic keyword and executes a corresponding piece of code. The result is that the program runs more slowly than a dedicated machine code equivalent as is the case with this emulator. A compiled Z80 program runs at about a sixth of the speed of a dedicated 6502 routine. Not that this matters a great deal as long as it runs well enough to show if the Z80 coding would work.

The Z80 assembler is a lot more flexible than YER's 6502 equivalent and includes facilities such as search and replace, a simple delete command, hex/decimal/binary calculator and a complete DOS support.

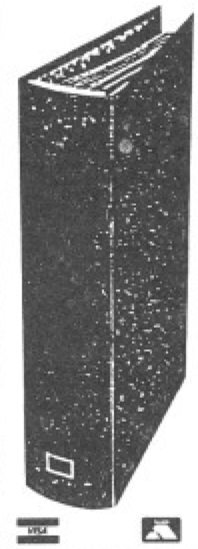
The actual assembler listing follows almost the same conventions as laid down by the 6502 assembler except that the code follows the correct Z80 mnemonic system.

Any emulation of one CPU by another is liable to compromises in the interests of speed and efficiency. In this case only the essential Z80 flags are supported: carry, zero and interrupt. With the exception of the IR pair, all of the CPU registers are supported, including the twin alternative set of registers. The net effect of these omissions is that some of the commands cannot be supported by the emulator. This is limited to 20 specific commands and doesn't cause any problems in learning Z80 code.

After writing your code in the assembler editor, you then save it to disk and load the compiler program. The compiler produces the object code which in turn is converted into the final 6502 version by the special saver program.

This is a novel and relatively cheap way of becoming familiar with the Z80 environment.

Touchline:
Product: *6502 Assembler.* ***Price:*** *£12.99.*
Product: *Z80 Compiler.* ***Price:*** *£12.99.*
Machine: *C64.*
Supplier: *York Electronic Research, The Fishergate Centre, 4 Fishergate, York YO1 4AB.* ***Tel:*** *(0904) 610722.*



Games Reviews

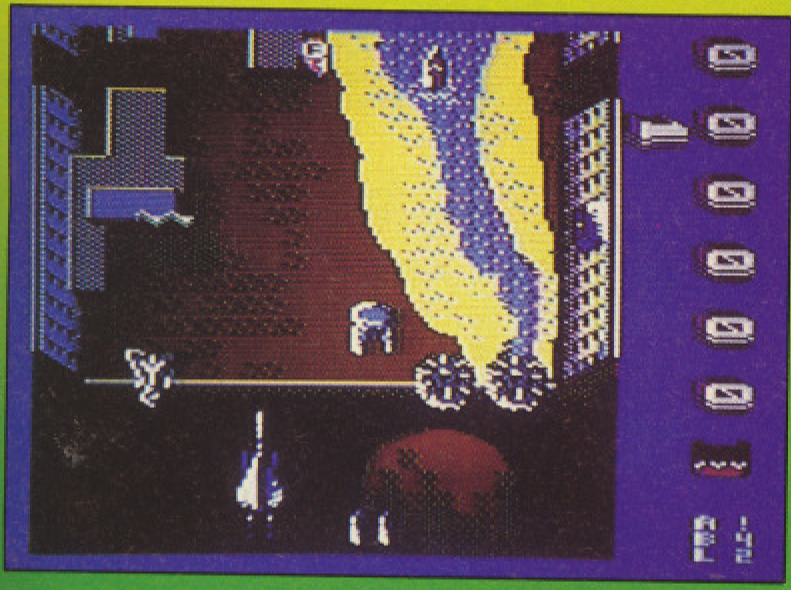
A look at the latest selection of games available.

ACTION PACK 3

The Action pack series are compilations of Alligata programmes that are sold exclusively through W.H. Smith. This, the third in the series, contains the Commando style shoot 'em up, Who Dares Wins II, an odd arcade game called Kettle, the terrible Indoor Bowling and superb Trap.

In Who Dares Wins II you're a man with a mission, a machine gun and eight grenades. Your objective is to single handedly take enemy outposts and free any of your comrades that need your unique (blast everything) help.

Indoor Bowling is a ten-pin bowling style of game but it lacks four pins and any point. The six pins that are there to be bowled over defy most of the laws of physics when they move as when you get a strike they all fall over, in perfect formation as soon as you touch the first pin.



Kettle is a curious arcade adventure in which you must break free from a 30 level underground complex. To move from level to level you must find the tin opener that's hidden in giant pots. Unfortunately, these pots also emit a constant stream of energy draining bubbles that must be deflected by your shield of protective orbiting crizza which can also be used to wipe out aliens. A weird game but fun to play particularly if you like kettles.

The final game, Trap, is undoubtably the best of the compilation and after a simple but ship expensive charge through an asteroid belt becomes a Zaxxon style game in which you must zap aliens, disable lasers, collect fuel, shoot spy eyes (if these escape they alert the dreaded polic craft) all to collect orbs to gain a better ship to survive a harder course.

The skill of the game (apart from surviving) is to plan your attacks so that you take out the levels aliens first (there's only a set of quota of aliens per level) before blasting the boats and lasers to get through to the end of the zone where you have to proceed on foot, past walkways to claim your orb. A great shoot 'em up in the finest tradition.

Trap and Who Dares Wins II are the games worth considering in this compilation, and the others should be viewed as a bonus. If you've got neither then it's worth a look but if you've already got one of these think again.

T.H.

Touchline:
Title: *Action Pack 3.* ***Supplier:*** *Alligata, Orange Street, Sheffield, 5S1, 4DW.* ***Tel:*** *0742 755796.* ***Machine:*** *C64.* ***Price:*** *£4.99.* ***Originality:*** *5/10.* ***Playability:*** *7/10.* ***Graphics:*** *6/10.* ***Value:*** *5/10.*

GUN RUNNER

Vroooooom, daka daka, booom, oh sorry but I've just been playing the new game from Power House, Gun Runner and I'm hooked!

You play a highly trained helicopter pilot on a mission to rescue your trapped buddies. Their ground bases have been blown to bits and they are sitting ducks, out in the open as enemy planes and other deadly aircraft swamp the sky – you are their only hope. Fly into the invaded territory and shoot down all aircraft (well, as many as you can) but most importantly rescue your pals.

Your helicopter has been fitted with the latest hydrolic winch and with a flick of a button it will drop down to ground and level and pick up any running people (your



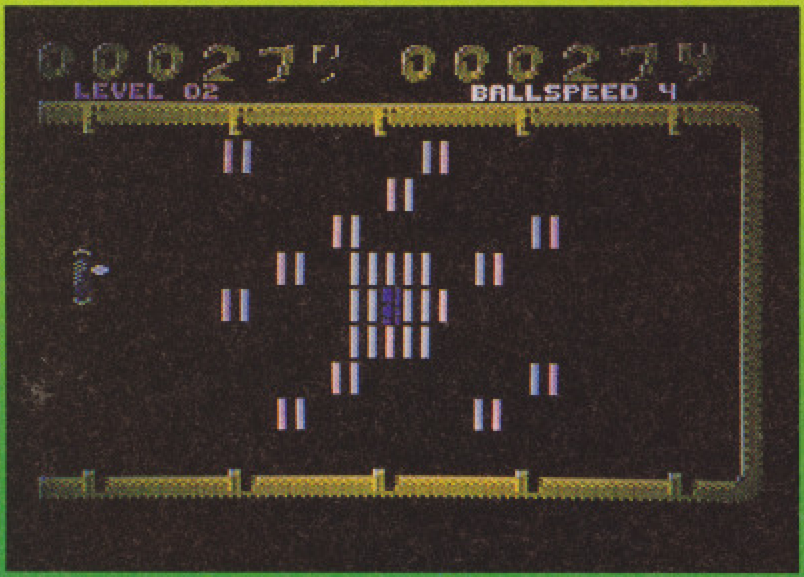
friends) leaving you to worry about the aircraft around you.

The background is very impressive and gives the true feeling of depth – yes the famous parralax scroll. The music is jolly (although there is none in the game) and spot effects are adequate. The end result is a highly playable, addictive well-presented game and at just under two pounds it's excellent value. Hats off to Power House. **K.R.**

Touchline:
Title: *Gun Runner.* ***Supplier:*** *Power House, 204 Worple Road, London, SW20 8PN.* ***Tel:*** *01-879 7266.* ***Machine:*** *C64.* ***Price:*** *£1.99.* ***Originality:*** *6/10.* ***Graphics:*** *9/10.* ***Playability:*** *9/10.* ***Value:*** *10/10.*

DEMOLITION

Demolition is a breakout/arkanoid style of a game in which you must guide a ball with a bat around a series of screens to clear away walls of bricks.



These bricks occupy most of the screen except the left hand side where you can move you bat up and down. If a ball gets past your bat then you lose a life, but if you clear all the bricks you'll survive to play the next level. They'll be a different pattern of bricks to break through as well as a few indestructable bricks and special bricks that can have a dramatic effect on the game.

Some bricks appear as numbers (1,2,3) which is the number of times you must hit it to destroy it and others give you bonus points and lives and some change the size and speed of your bat. One reverses your bat controls while another acts as glue that sticks the ball to your bat until you press the button and yet another builds a wall of single bricks behind the bat to save the ball if you miss it.

The result is a good variant of the tried and tested breakout formula that first appeared in the arcades over 12 years ago! **T.H.**

Touchline:
Title: *Demolition.* ***Supplier:*** *Anco.* ***Machine:*** *C16/Plus/4.* ***Price:*** *£7.99.* ***Originality:*** *2/10.* ***Playability:*** *7/10.* ***Graphics:*** *5/10.* ***Value:*** *7/10.*

STARPAWS

Out in the far reaches of space, in the farthest Galaxy, a huge money war is being pledged. Well, not exactly money but space birds known as griffins. You see as this bird was acclaimed a galactic delicacy, and acquired such value it came to be used as an extremely valuable unit of inter-galactic currency, traded on the stock market of the universe.



On the moon of a far-away planet, a gang of unscrupulous mercenaries have been secretly breeding the tasty space griffin and plan to flood the market with them. This would of course throw the monetry systems up in the air, allowing them to sieze over all power.

This can not be allowed to happen so starfleet command intend to send Neil Armstrong to wipe out this dirty trick and anyone caught breeding them. But due to an error on the communications computer the dodgy captain Rover Armstrong was sent instead. Of course, he was vastly inexperienced but the task is simple enough – just capture or destroy all the griffins on the planet. The griffins note his arrival and promptly make themselves scarce, (not so easy after all!). Captain Rover gets help from the scout ships that drop off various supplies to help catch the birds, such as speed. When you are nearing the griffin, press the button

and you will leap, hopefully right onto the griffin back, and then you eat him. Other goodies include the space explosives (my favourite) when you are right near the griffin they will slow down but won't let you get too close, just select this weapon, push the button and POW feathers fly (hee, hee!).

There are loads of different traps and such like and even when you've seen them all, this is a fabulous arcade game combined with a fair bit of strategy.

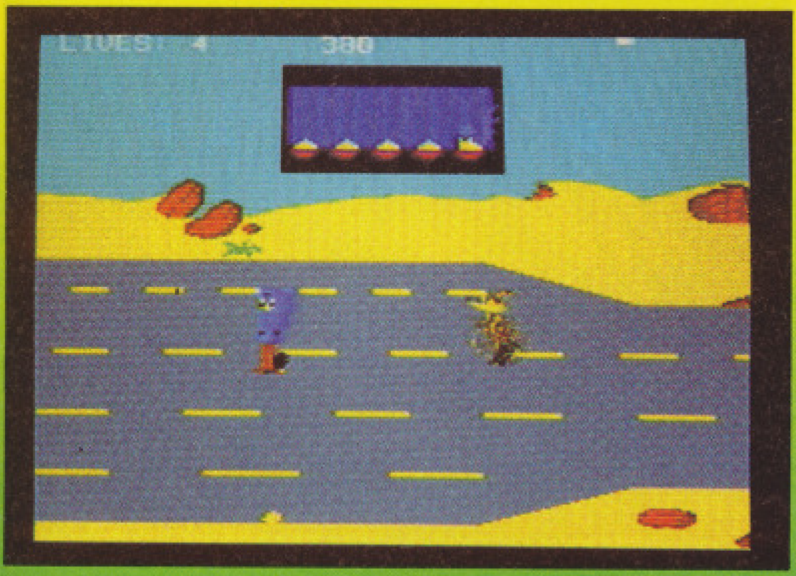
For just over a fiver this game represents very good value, nice sound (Robb Hubard), amazing parallax background.

I don't need to tell you to buy, I bet you're putting on your coat now, go on then, get down to your local software shop. **K.R.**

Touchline:
Title: *Starpaws.* ***Supplier:*** *Software Projects, Bear Brand Complex, Allerton Road, Woolton, Liverpool, Merseyside L25 7SF.* ***Tel:*** *051-428 9393.* ***Price:*** *£5.99.* ***Originality;*** *7/10.* ***Graphics:*** *9/10.* ***Playability:*** *8/10.* ***Value:*** *9/10.*

ROAD RUNNER

Beep. Beep. Stopping only for a quick peck of corn, Road Runner zooms off into the distance leaving only a cloud of dust behind while the hapless Wile E. Coyote is left to suffer the consequences of his latest, backfired plan. That at least is the theory.



Having started in a cartoon and progressed to an arcade game, Road Runner has finally arrived on the 64. You play the part of the scrawny looking bird and your objective is simple – to survive.

Each level presents a new series of obstacles apart from the ever-present Wile E. Falling boulders, speeding trucks, crevasses and mines must all be avoided and throughout you must keep eating piles of seed.

Wile E. Coyote makes frequent use of the Acme company as he buys their latest gizmos in an ever-more desperate attempt to catch up with you, so expect to see him whizzing past you at high speed on a jet-propelled skateboard, rocket, jetpack or even pogo stick. Should you cause him to walk into one of the hazards you have just avoided, then so much the better.

Although a nice idea, I found Road Runner totally lacking in playability on the cassette version. Each level, although short, has to be loaded in separately from tape. When you die, the tape has to be rewound as you start again. Even if you take the profferred short cut to the last level you reached in the previous game, you have to wait for all the intermediate levels to load in one by one. If Road Runner had to wait this long, he would have been barbecued long since.

If you can put up with the problems of using the tape, the game itself seems to be a competent version of the arcade version and fans will no doubt want to buy a copy. Otherwise, it's a case of try before you buy. That's all folks.

G.R.H.

Touchline:
Title: *Road Runner.* ***Supplier:*** *US Gold. Unit 2/3 Holdford Way, Holdford, Birmingham B6 7AX.* ***Tel:*** *021-356 3388.* ***Machine:*** *C64.* ***Price:*** *£9.99 (ca), £14.99 (d).* ***Originality:*** *7/10.* ***Graphics:*** *7/10.* ***Playability:*** *5/10.* ***Value:*** *6/10.*

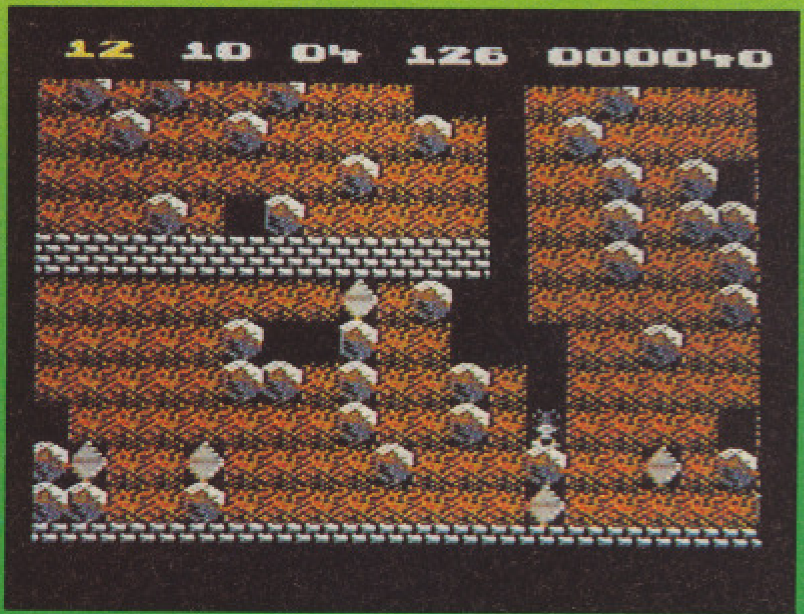
ROCKFORDS RIOT

At last, First Star, the makers of the famous Rockford character have released Bouldersash I and II at only £2.99 each.

I was pretty chuffed as I was never able to get hold of the first game which was very good. I wondered why they had waited so long to release it?

Anyway, for those of you who have not heard of these games, I'll tell you more. There was a little guy called Rockford and he liked nothing better than collect precious gems and valuable rocks.

One day, while out walking his dog he stumbled across a cave, and being of a curious nature he decided to investigate. He sent his dog home and went in and was amazed at what he saw – huge gems and jewels stuck in the ground,, so not to miss the big chance he started to collect the gems, when he had them all he heard a strange noise and noticed that the entrance was gone and a new one had appeared. So in he



went, and there he discovered another cave containing more jewels. As he progressed deeper into the complex he started to encounter various nasties such as deadly butterflies that would explode and turn into jewels. 'Great', he thought, that was until he got caught up in the explosion, but strangely he felt alright after a while, he had just lost one of his three lives.

Other meanies he met included huge fireflies that would explode when hit by one of the many boulders, which caused a very powerful explosion but maybe he could use it to his advantage?

Soon Rockford meets up with the giant Amobea, a huge green slime that slowly oozes its way through the cave destroying anything that gets in its way. Then Rockford has an idea, surround it with rock so it can't move. So he does this, and waits patiently, and after about two minutes he is standing nearby tapping his feeet when POW the green slime goes bang and turns into jewels. 'Wow', he says, 'I must have suffocated it. Quite a good idea though.'

You should have the idea by now – Boulderdash and Rockfords Riot are just search-think-collect-dodge games and prove very taxing on the old grey matter. If you do not have any of these two games then go and get them. They are very good value and you should think yourself lucky that you did not buy them two years back when you would have paid just under a tener. Good graphics, nice sound, decent gameplay and brilliant value, which is surely enough reason to add these to your collection. **K.R.**

Touchline:
Title: *Boulderdash/Rockfords Riot.* ***Supplier:*** *Prism Leisure, Unit 1, Enfield, Middlesex EN1 1SJ.* ***Tel:*** *01-804 8100.* ***Price:*** *£2.99 (each).* ***Originality:*** *6/10.* ***Playability:*** *9/10.* ***Graphics:*** *7/10.* ***Value:*** *9/10.*

HERO

You are Roderick Hero, ace member of the Helicopter Emergency Rescue Operation team. All you know is that there is a miner trapped somewhere underground by a freak explosion and that you have a limited amount of time in which to rescue him.

A re-release of the old Activision game, which consists of a number of cave systems, each one of increasing complexity. Rock falls block your way and must either be dynamited or shot through. Strange creatures appear in front of you and must be shot or dodged, such as, spiders, bats and green slimy arms that try to grab you as you pass. Accidentally hitting a light switch will plunge the caves into darkness so that you have to navigate by guesswork – very dangerous as contact with lava results in the immediate loss of one of your lives. All you have to do then is to make sure that you don't plunge your helicopter into the icy waters. The added time pressure does little to help either.



The game looks more than a little dated now (not surprisingly really) and is graphically crude. For all that, there is still an initial addiction but once you start remembering where all the hazards are, that also wears off soon. **G.R.H.**

Touchline:
Title: *Hero.* ***Supplier:*** *Firebird Silver, Wellington House, Upper St Martins Lane, London WC2H 9DL.* ***Tel:*** *01-631-5206.* ***Machine:*** *C64.* ***Price:*** *£1.99.* ***Originality:*** *3/10.* ***Graphics:*** *3/10.* ***Playability:*** *4/10.* ***Value:*** *4/10.*

TERRA NOVA

If you need to flex your fire button finger then load in Terra Nova and get zapping. It's a no frills shoot 'em up in which you have four zones to clear. In Terra Nova 'clear' means blast everything to smithereens.



To complete the game (which is extremely unlikely) you must blast your way through each zone three times! The first trip is the relatively easy one as you can fly and blast away quite happily without worrying about fuel or ammo, but in the next two flights you must collect these by destroying the enemy dumps.

Your main hazards come in the form of alien crafts that buzz you and space mines that you can't shoot but which wreck you. The mines are fired by ground installations that must be destroyed to gain points and reduce the number of mines, leaving you to dogfight with the aliens.

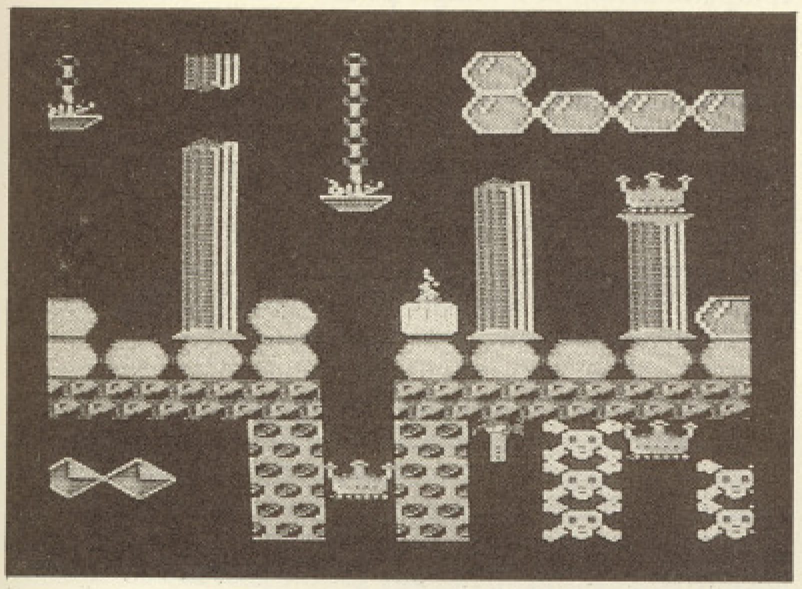
The first zone is set in space and once you complete that, three times, you can tackle the battles of a ground base, an Earth like landscape and the high seas.

A fun shoot 'em up that you'll enjoy but don't expect too much. T.H.

Touchline:
***Title:** Terra Nova. **Supplier:** Anco, 35 West Hill, Dartford, Kent DA1 2EL. **Tel:** 0322 92513/8. **Machine:** C16/Plus/4. **Price:** £7.99. **Originality:** 6/10. **Playability:** 6/10. **Graphics:** 5/10. **Value:** 5/10.*

REALM

Reconstructing the entire solar system is the minor task facing you. The Planetary Orbiting Co-ordinator has developed a serious malfunction and planets are scattered everywhere. You must control an XR3 droid and manoeuvre it round the Inner Co-ordination Sanctum.



In other words, the game consists of a large maze and you must wander around it collecting objects and solving problems. As you progress, you must relocate the nine planets in their correct place around the sun.

Not all areas of the maze are immediately accessible to you. Walking past certain points causes doors to spring shut behind you, trapping you if you have not taken sufficient care over your route. Arrows point the way but their main use is that when you stand next to them, they cause doors to open elsewhere in the maze; causing a lot of backtracking. As your progress further, so there are items to be collected which are then used to remove further obstacles in your path.

The maze is constructed of brightly coloured blocks and designs – graphically simple but effective enough. Certain blocks are lethal to touch but it shouldn't be too difficult to work out which ones they are as skull and crossbones usually tend to conceal something nasty!

Lack of any sort of action is likely to limit the appeal of Realm to maze fans, but it's not a bad game for the price. G.R.H.

Touchline:
***Title:** Realm. **Supplier:** Firebird Silver, Wellington House, Upper St. Martins Lane, London WC2H 9DL. **Tel:** 01-631 5206. **Machine:** C64. **Price:** £1.99. **Originality:** 5/10. **Graphics:** 5/10. **Playability:** 6/10. **Value:** 6/10.*

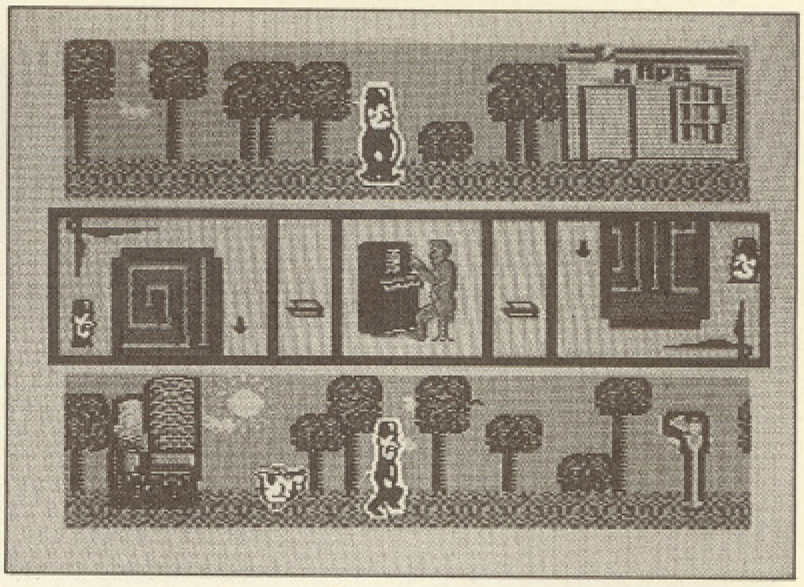
LAUREL AND HARDY

Laurel and Hardy have had a tiff. Nothing unusual in that you may say, they had at least one in every film that they made. Still, satisfaction is demanded and can be settled in the only way slapstick comedians know how – a custard pie in the face.

So, Stan and Ollie set off round a strange town in search of the local flan emporium. On their way, they will find plenty of opportunities to collect objects and use them to hinder the other – ball bearings, oil and broken glass. Just the sort of things an unsuspecting person can trip up on. Other features include riding on a bike to speed up your movement, recruiting the dubious services of a small dog and the presence of the Keystone Kops.

The screen is divided into three sections. The top shows Ollie's current whereabouts. All movement is shown on an east-west axis regardless of which way you are actually heading. As this is rather confusing it is strongly recommended to get a map. Likewise, the bottom half of the map is used for Stan. You can play either character against the computer or a friend.

The central area shows a picture of each character together with a series of icons indicating what he is currently carrying. The colour of your face shows how thirsty you are. You have to stop off occasionally to take on board liquid refreshment – non-alcoholic of course.



I'm afraid that this is yet another example of a dreadful licensed game. Companies pay a lot of money to use a title like this and are obviously eager to get something onto the market to recoup their investment as quickly as possible. All this pressure can only squeeze one thing – the game, and it shows. In Laurel and Hardy, the action is spread over too great a distance which makes the gameplay extremely tedious in the extreme. Less than adequate game control and display don't help either. The result is a poor man's Spy versus Spy.

Perhaps if software houses took the time and money to employ the services of a games designer and graphic artist rather than expect the poor programmer to come up with ideas, graphics and music as well as code everything, licensed games might have a better reputation. With Laurel

and Hardy, as Ollie might have said, 'Here's another fine mess.' **G.R.H.**

Touchline:
Title: *Laurel and Hardy.* ***Supplier:*** *Advance Software, 17 Staple Tye, Harlow, Essex CM18 7LX.* ***Tel:*** *0279 412441.* ***Machine:*** *C64.* ***Price:*** *£9.95.* ***Originality:*** *5/10.* ***Graphics:*** *5/10.* ***Gameplay:*** *3/10.* ***Value:*** *2/10.*

ZYNAPS

Zynaps is the latest shoot 'em up from Hewson in which you must fly your Scorpian fighter through screen after screen of alien spacecraft, command ships, mother ships and planet installations that shower you in homing and seeker missiles.

Your Scorpion fighter is fitted with a standard missile launcher but also a fuel scoop that can absorb the energy capsules left after a wave of aliens or ground installation is destroyed. Collect enough of these and you could activate other weapon systems such as more speed, greater firepower, bombs and homing missiles.

At the end of each sequence you will have to fight your way past a mothership or a command vessel that can only be destroyed by several well-timed shots or by homing missiles.

As you blast aliens and avoid their missiles as well as the background structures (that are just as deadly) your ship will get stronger and stronger, but so will the opponents you'll face.

Although Zynaps will give your fire button finger a good work out it is a little more than a Nemesis variant. It's good, but we've come to expect more than this from Hewson.

T.H.

Touchline:
Title: *Zynaps.* ***Supplier:*** *Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon, Oxon OX14 4ZX.* ***Tel:*** *0235 832939.* ***Machine:*** *C64.* ***Price:*** *£8.99 (ca), £12.95 (d).* ***Originality:*** *3/10.* ***Playability:*** *7/10.* ***Graphics:*** *6/10.* ***Value:*** *7/10.*

ZOLYX

Do you remember an arcade game called Qix that was then converted for every machine possible in a bewildering array of names that all ended in the letter X? Now here comes Zolyx which is the same old annoyingly addictive game that I just can't stop playing.

The game is incredibly simple. All you have to do is paint 75% of a screen by moving your zolyx and boxing off sections which then turn blue.

Naturally, there's a catch in the shape of zolyx zapping balls that cost you a life if they either collide with you or a box that you're drawing with the white line that follows your movements in clear territory. Lose your lives and you lose the game.

If you manage to complete a screen then you're rewarded with a bonus life and you're onto the next screen which has even more balls to avoid.

A simple but ridiculously addictive game. **T.H.**

Touchline:
Title: *Zolyx.* ***Supplier:*** *Firebird, Wellington House, Upper St Martins Lane, London WC2H 9DL.* ***Tel:*** *01-631-5206.* ***Machine:*** *C64.* ***Price:*** *£1.99.* ***Originality:*** *2/10.* ***Playability:*** *7/10.* ***Graphics:*** *4/10.* ***Value:*** *7/10.*

TABLE FOOTBALL

Have you ever played those table football games where the pieces are controlled by turning handles? Well, now you can bring the excitement into your home and onto your computer screen at a budget price.

The game is only a two player game in which left and right joystick pushes move the selected bar (this is the one nearest the ball) and forward and back to kick.

The game is a best of nine goals match with the current score displayed on the pitch and not in the oceans of room above the table.

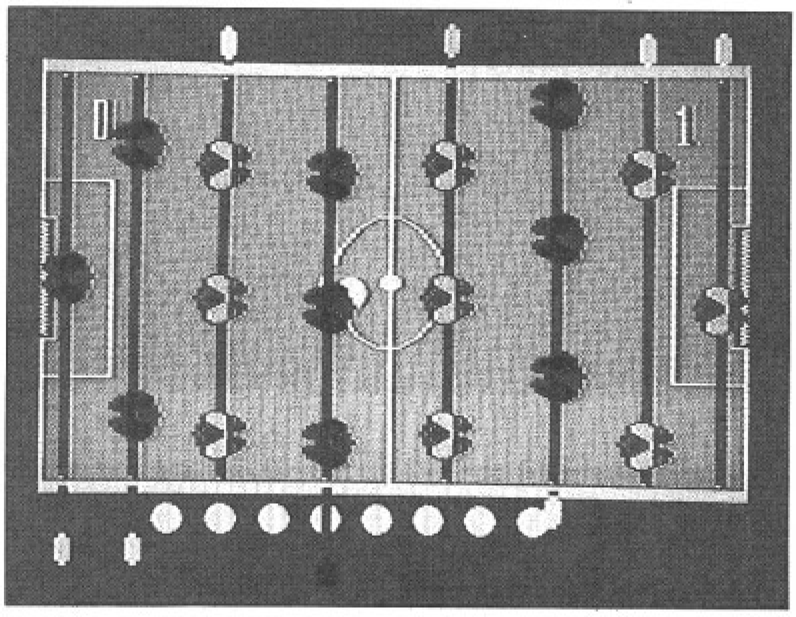
Budgie isn't the first software house to attempt to computerise table football, indeed Bubblebus produced a good version called Kick-off. This is not a good version for two annoying reasons.

Firstly all the players look as if they standing upright but aren't as the ball will pass under them unless you kick it. This is, of course nonsense and spoils the game as well as stopping the players trapping and controlling the ball and turns the game into a kicking match. Secondly, should you score a goal (these can sometimes be scored by kicking the ball past the post??) your opponent may get the goal or occasionally both of you get it!

Even if the program wasn't bugged, it just wouldn't be worth the money even at a budget price.

T.H.

Touchline:
Title: *Table Football.* ***Supplier:*** *Budgie, 1 Orange Street, Sheffield, S1 4DW.* ***Tel:*** *0742 755796.* ***Machine:*** *C64.* ***Price:*** *£1.99.* ***Originality:*** *3/10.* ***Graphics:*** *4/10.* ***Playability:*** *6/10.* ***Value:*** *4/10.*



The Personal Choice Collection

A trio of packages for the home or small business user which includes a word processor, database and spreadsheet program that can be used separately or integrated through common files.

By Tony Hetherington

The collection is supplied in a library box set with each program accompanied by a quick reference guide. Also a full manual is provided complete with worked examples and tutorial sections that takes you through the basic operating instructions, and then onto advanced features and finally how to interface with the other programmes in the collection.

Writer's Choice

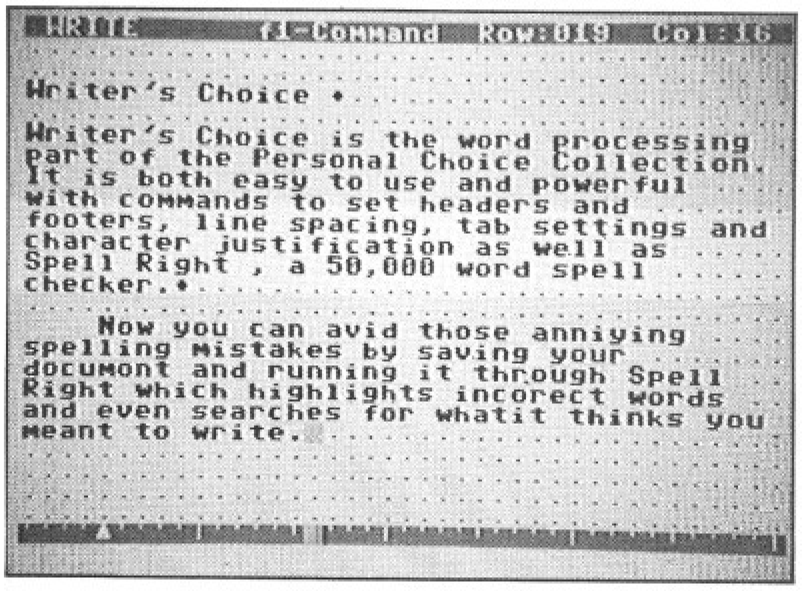
Writer's Choice is a full blooded word processor capable of handling complex documents with headers and footers, justification search and replace, formating and a 50,000 word spell checker!

Once Writer's Choice has loaded, you are presented with a menu to write a document, format a page, LOAD, SAVE or PRINT a document or format a blank disk or produce a test print. You can then easily write a letter, memo or magazine article and correct typing mistakes, copy, move or delete blocks of text by pressing a few keys.

A Writer's Choice document can consist of 600, 40 character lines that appear on the screen as dots until they are over-types. That should be enough for most applications but if it isn't you can chain documents together to form massive documents that can be printed out on almost every combination of printers and interfaces.

You can also read in files created by Filer's Choice and Planner's Choice and incorporate them into reports or use the Filer's Choice data to form a mailing list.

Writer's Choice is probably one of the easiest word processors I have ever used (there's always a help key in reach if you get stuck) yet it possesses some complex



functions and commands. For example, the search and replace command 'the' will find 'the' and 'The' but the command '/the' is even more powerful as it finds part words such as 'there' and 'whether'.

Once you've created your letter, memo or article you can preview to see what it will look like on paper and then check it with the impressive Spell-Right and get a word and character count.

Spell-Right is supplied on a separate disk so you must save your document and then load it in for checking. The Spell-Right disk is double-sided and both must be used in turn to check words that begin with letters between A and N and O and Z. This takes a while particularly if you've added your own dictionary to the 50,000 words that are already checked.

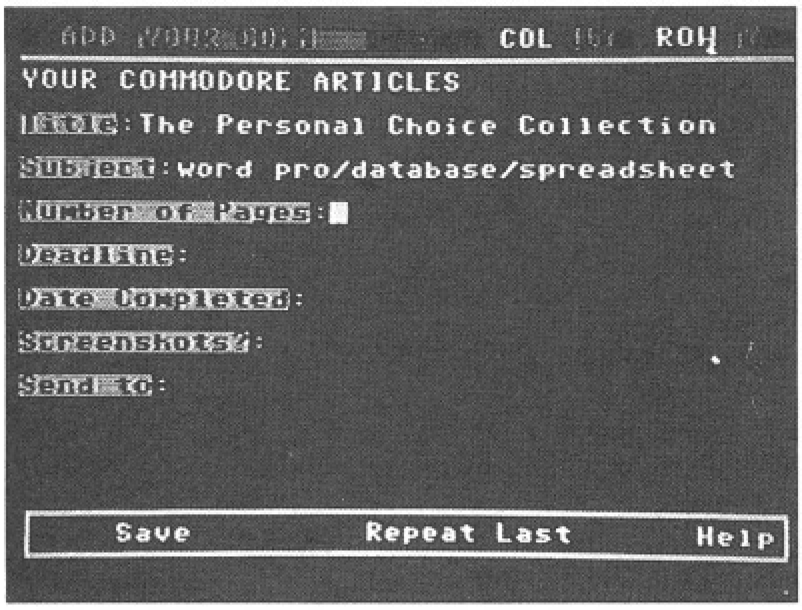
Once the program has finished it highlights any words it can't find. These can be altered, ignored or added to another dictionary. If you don't know how to spell a word you can have another go, and have that checked or you can even get Spell-Right to list all the similar words it can find for you to choose between!

Filer's Choice

Every integrated package needs a database program to store and organise information so that it can be updated, sorted into order and then printed out by the word processor.

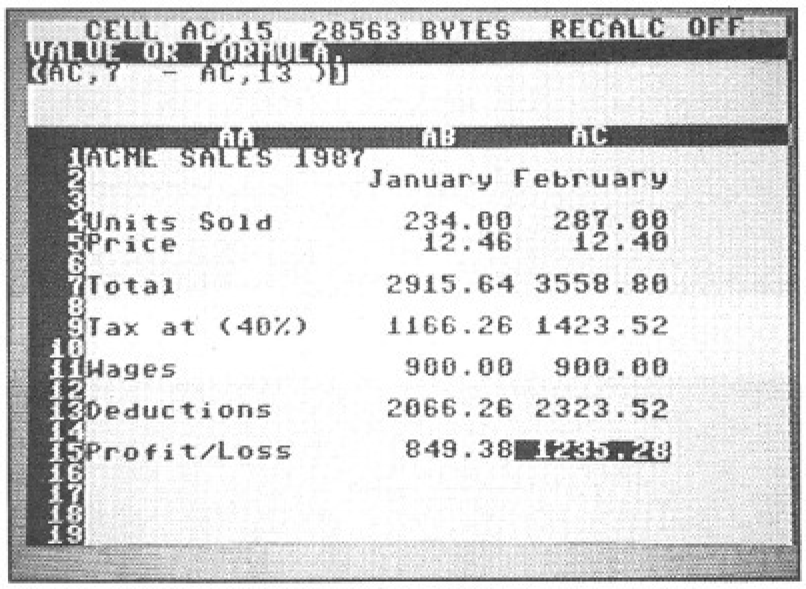
A Filer's Choice database consists of records that are created by typing on a screen and can be between 20 and 80 lines long. To create a database you simply have to type on the screen the records you want to keep and then save them to disk. You can then add new entries, delete records or edit existing ones, sort the whole file into alphabetical order (to whatever is defined at field 1) and search for a specific record or group of records by setting greater than and less than parameters.

Once you have the information stored in a format that's easily edited and updated you'll want to do something with it such as create mailing lists and print out labels and other reports or lists. Creating a report is easy as the program presents you with a list of the fields in each record in your file and all you have to do is put them in the order you want them on your form. You don't have to include all of them (indeed a useful printout is a list of phone numbers) and you can signal the computer to print more than one on the same line. This report or print out can then be displayed on the screen, saved to disk to be used with Writer's Choice or printed out directly.



Planner's Choice

Planner's Choice is the third and final part of this application program package and features a fully fledged spreadsheet program for planning your finances and asking those 'what if' questions. What if VAT goes up, what if the cost of disks doubles, what if I sell 20% more games, what will happen to the price Mega Game 3? The answers and many more can be posed and answered by a spreadsheet.



The uses and applications of a word processor and a database are obvious but who would use or need a spreadsheet? The answer is that you don't need a multi-million pound budget to gain from using a spreadsheet. Club treasurer's, comparing investments or home and tax accounts are all made easier by using a spreadsheet and even if you're planning to run your own business, a spreadsheet printout will impress the bank manager.

Unfortunately, the spreadsheet screen looks daunting with only a few lines that outline the cells of the programmes work space. By using the Planner's Choice manual you'll learn that each of these cells can contain text (a heading so that you understand what's going on), figures and formulas to add up the contents of other cells or perform calculations. With these you can add up the subscriptions you've received, deduct the heating and lighting bills and rent of your club house and find out how much you've got left for trips or equipment and see whether this figure is increasing or decreasing, in which case you'll have to increase your subs. Similarly, a businessman can calculate profits, expenses and wages to set prices to keep the taxman at bay and be ready for any crisis such as the Chancellor deciding to put up beer, petrol or VAT.

By changing a single figure you can create a whole different set of circumstances which the program can recalculate in seconds giving you the new results and a jump ahead of the opposition.

Once your spreadsheet is complete you can either save it to disk and incorporate it into a word processor document or print it out individually directly from Planner's Choice.

The Personal Choice Collection is a powerful trio of packages that will put your C64 to work. There is also C128 versions that load automatically from disk that basically extend the screen size from 40 to 80 characters. The collection is a little expensive at £69.95 but does contain all you need to write documents and check the spelling, store information and get your finances into shape. The packages are easy to use and are supported by some superb documentation. YC

Touchline:
Name: *The Personal Choice Collection.* ***Supplier:*** *Personal Choice Software.* ***Tel:*** *01-431 1101.* ***Machine:*** *C64.* ***Price:*** *£69.95.*

FOR SPEED, POWER AND EASE OF USE

FREEZE MACHINE

Now with.. "Single part save" Includes.. "Freeze Frame MkV & Lazer II"

CHILLS THE REST!

- **Freeze...** Totally unstoppable Freeze facility from the originators.
- **Fast Save...** Saves in as little as 15 seconds. Nothing else can match this
- **Multiple Save...** Make as many saves as you want once frozen, in different styles if you wish.
- **Ultra Compact...** The most efficient compacter? Our tests indicate this, as many as 5-6 games per disk.
- **Game Killer...** Incorporates an effective routine to disable collision detection.
- **Independant...** Even produces stand alone Lazer files that reload in as little as 10 seconds.
- **Ease of use...** Always a strong feature, now even more enhanced.
- **Multi-Load...** Standard cartridge handles many games of this type. With the utility disk even more!
- **Fast Format...** Formats your disks in about 12 seconds.
- **File Copier...** Built in fast copier handles files up to 248 blocks long and is really easy to use.
- **Two Fastloads...** A normal disk turbo at 5-7 times normal PLUS the astonishing Lazer at 20+ times normal...BUILT IN.
- **Selectaload...** Just use cursors to scroll to the program you want and press a function key.
- **Reset...** Built in, so you can enter pokes for more lives etc.
- **Tape Turbo...** For quick save/reload on tape.

From reviews of Freeze Frame/Lazer

Don't take our word for it

"...far outstrips the opposition on both price and performance ..."
Commodore Review

"...the most exciting and lightning fast I have ever used..."
Commodore Computing International



Why Freeze Machine?

This is the latest and most effective backup cartridge from Evesham Micros, the originators. It's speed of operation is the staggering feature. Imagine being able to SAVE & reLOAD your favourite games in as little as 10 seconds and no more than 18. No other "device" can remotely match these figures...remember these facilities are *built in*. Buy the "Freeze Machine" and see it perform, if you don't agree that it is the most formidable cartridge available return it within your statutory 28 days for full refund, we are that confident.

ONLY £28.95

UPGRADES

MkI, II, III, IIIB	£19.95
MKIV	£ 7.95
Lazer	£ 2.00

FREEZE FRAME STRIKES BACK

Freeze Machine Utility Disk V3.0

Latest version of the disk that complements the use of the Freeze Machine. Includes well over 30 routines. Allows the complete transfer to disk of many programs that load extra parts as the game progresses (the ones the standard cartridge cannot handle). Includes many of the latest popular titles like Last Ninja & Gunship plus many "standards" like World Games & Supercycle. Avery useful add-on to your Freeze Machine.
Upgrades: £2.00

ONLY £7.95

QUICKDISC+

Our highly popular fast load and save plus utility cartridge has received many favourable reviews.

- **FAST LOAD (5 to 7 times improvement)**
- **FAST SAVE (5 to 7 times improvement)**
- **FAST FILE COPY (up to 248 blocks)**
- **RESET BUTTON (unstoppable)**
- **CENTRONICS PRINTER DRIVER**
- **FAST FORMAT (20 seconds)**
- **FAST BACKUP (4 minutes)**
- **EASY DOS COMMANDS**
- **HELPS MENU**
- **USES NO MEMORY**
- **'128 COMPATIBLE ('64 mode)**

ONLY £19.95

1541 Quiet Stops

Cure for ever the dreaded 1541 drive head "hammering"

- **Easy to fit**
- **Detailed instructions**
- **One kit does two drives**
- **Helps prevent misalignment**

Not suitable for "turn lever" type drives

ONLY £4.95

Disc Disector V5.0

The fifth version of the country's **leading** disc backup utility program. This latest version includes **many "PARAMETERS"** to handle the latest highly protected discs. This includes the latest **American and English software.** Be warned if you want to back up software by Ocean, Gremlin, Hewson, Domark, and even U.S. Gold whose protection schemes are NOT always the same as the American versions, then you **MUST have "D.D."**. At press date, **we are sure NO other advertised product will handle all these, be it American or German.**

INCLUDES THE FOLLOWING

- **EVESHAM 3 MINUTE NIBBLER**
- **EVESHAM 8 MINUTE NIBBLER**
- **MANY PARAMETERS** (The vital code for the protection schemes)
- **DUAL DRIVE NIBBLER**
- **MENU MAKER (with select facility)**
- **DISC ORDERLY**
- **FAST FORMAT**
- **FAST FILE COPY**
- **UNSCRATCH**
- **DISC RESCUE**
- **DISCMON+**
- **ETC., ETC., ETC.**

Upgrade fee: £7.95
Most routines CBM 128 & 1570/71 compatible
Perfect operation with Excelerator+

ONLY £24.95

DOUBLER

Many thousands of this popular product have been sold and sales continue to flourish. Why? We think because it is the best product of it's type. Consisting of hardware and software it uses a unique method controlled by the software that allows you to produce perfect backups of your tape software.

It is very easy to use and very successful.
Our tests have proved that Doubler can achieve 100% success

ONLY £12.95

1541 Physical Exam

Have you got . . . Alignment problems

If so, you need this package. Contains digital alignment disc and drive fault diagnosis software that allows you to check **and correct** head alignment.

- **CHECKS RADIAL ALIGNMENT**
- **CHECKS SPEED**
- **CHECKS BELT AND CLAMPING**
- **THOROUGH INSTRUCTIONS**
- **INCLUDES QUIET STOPS**

ONLY £39.95

Evesham Micros

How to order

Send cheque/P.O. or Access/Visa details
By phone with Access/Visa no.
Government, educational & PLC orders welcome
Same day despatch whenever possible
All offers subject to availability. E.&O.E.
Callers welcome, open 6 days 9.30-5.30
Next day delivery on any item £5.00

Evesham Micros
63 Bridge Street
Evesham
Worcs. WR11 4SF
TEL: (0386) 41989
TELEX: 333294 EMICRO

Also at; 1756 Pershore Rd., Cotteridge, Birmingham B30 3BH Tel; 021 458 4564

Arcade Action

Producing your own scrolling messages and plotting on the screen.

By Tony Crowther

Scrolling messages have become commonplace within game programs. Such messages can range from game instructions to amiable slanders about friends and other programmers. Here's a routine that allows you to scroll a message up to 255 characters long across the top of the screen.

Drawing borders and lines, and doing it quickly, is very important in games writing. So, I've also presented a routine that enables you to plot small blocks extremely quickly at any point on the screen.

Get It Scrolling

The routine presented here for scrolling messages is nothing to jump up and down and shout about. However it is a simple but effective way of producing your own scrolling messages.

As usual there are three programs associated with the message scroll routine. Firstly, we have the Basic loader, called 'MESSAGE LOADER'. This routine holds the necessary machine code within Basic DATA statements. These are then POKEd into the correct area of memory when the program is RUN. The second listing, 'MESSAGE M/C', is an assembly version of the program so that those of you interested in machine code can see how the program works. The third routine, 'MESSAGE DEMO', is a simple demonstration that shows the program in operation.

Using The Routine

The scrolling is extremely simple to use and should cause you no problems. It does require the IRQ DATABASE routine to be in memory before you RUN. For those of you who missed the IRQ DATABASE in the March 1987 issue of Your Commodore I have included it here. To use the routine you should follow this procedure:

1) POKE 839.0
2) Clear the screen.
3) Print the message on the screen (255 characters long).
4) Type SYS 50817, COLOUR, SPEED.
5) Clear the screen.
6) POKE 839, 1 to return the message on.

The values for COLOUR are the normal colour codes as described in your manual.

SPEED should be between 0 and 8, where 0 means stop and 8 is fastest.

If you are still unclear as to what you should do read the example — it should make things clearer.

Screen Plotting

The second routine presented here allows you to place a quarter-character sized block, 4 x 4 pixels, at any specified position on the screen in any colour.

At first glance this routine will appear to be of little use in arcade programming, however it will become invaluable when drawing borders or lines on the screen.

Once again three programs are presented. The first, 'PLOT LOADER', is the Basic loader for the PLOT routine. The second program, 'PLOT M/C', is the machine code version of the program. As usual a demonstration is included. 'PLOT DEMO', showing the program in use. The syntax for this routine is as follows:

SYS 50616, X, Y, COLOUR

where X is the range 0-79 and is the horizontal co-ordinate for the dot. Y is in the range 0-49 and is the vertical co-ordinate of the dot.

Colour is a standard colour code (0-15).

Brought Forward

In the last gripping episode I set you a couple of tasks to perform with the routines that I had already published. I am sure that you all managed to carry out the specified tasks without too many problems. Just in case you didn't, I have included here my versions of the programs.

The first program 'DEMO EXTENSION', links together the two sprite routines and produced animated, moving sprites. The second routine, 'HELI DEMO' moves last month's sprite around the screen.

If you couldn't get your own sprites moving then following these programs through should make life easier.

REMEMBER before you RUN any of these programs you must have the relevant routines from my previous articles in memory or your computer will crash.

```
1000 ;******************************
1010 ;****  SCROLLING MESSAGE   ****
1020 ;******************************
1030 ;
1040 JUMPTB   = 49240        ;JMP TABLE
1050 BASIC1   = 44797
1060 BASIC2   = 44426
1070 BASIC3   = 47095
1080 PAGE     = 20
1090 DATA     = 40532
1100 COLOUR   = 40531
1110 SPEED    = 40530
1120 FLAG1    = 40529
1130 XFLAG    = 40528
1140 RASTCO   = 40527
1150 TEST     = 40526
1160 SCREEN   = 1024
1170 FLAG     = 839
1180 COLSCR   = 55296
1190 RASTER   = 53266
1200 XPOS     = 53270
1210 IRQOUT   = 60033
1220 *        = 50817
1230 ;
1240 PROG1
1250          JSR BASIC1      ;GET COLOUR
1260          JSR BASIC2
1270          JSR BASIC3
1280          LDA PAGE
1290          STA COLOUR
1300          JSR BASIC1      ;GET SPEED
1310          JSR BASIC2
1320          JSR BASIC3
1330          LDA PAGE
1340          CMP #9          ;CHECK FOR 8 MAX
1350          BCS EXIT
1360          STA SPEED
1370          LDA #<PROG2     ;CHAIN PROG2 TO IRQ
1380          STA JUMPTB
1390          LDA #>PROG2
1400          STA JUMPTB+1
1410          LDX #1
1420          STX XFLAG
1430          LDX #0
1440          STX RASTCO
1450          STX FLAG1
1460 LOOP1
1470          LDA SCREEN,X    ;STORE MESSAGE TO
1480          STA DATA,X      ;MEMORY
1490          INX
1500          BNE LOOP1
1510 EXIT
1520          RTS
1530 ;
1540 ;
1550 PROG2
1560          LDA FLAG        ;SWITCH ON/OFF
1570          BEQ EXIT
1580          INC RASTCO      ;RASTER COUNT
1590          LDA RASTCO
1600          BEQ NEXTPG
1610          LDA #200        ;RE-SET XSCROLL
1620          STA XPOS
1630          LDY FLAG1       ;POSSION IN DATA
1640          LDX #0
1650 LOOP2
1660          LDA COLOUR      ;STORE COLOUR ON
1670          STA COLSCR,X    ;SCREEN
1680          LDA DATA,Y      ;STORE DATA ON
1690          STA SCREEN,X    ;SCREEN
1700          INY
1710          INX
1720          CPX #40
1730          BNE LOOP2
1740          LDA #255        ;RE-SET COUNT
1750          STA RASTCO
1760          LDA #255        ;NEXT RASTER AT 255
1770          STA RASTER
1780          RTS
1790 NEXTPG
1800          LDA #58         ;NEXT RASTER AT 56
1810          STA RASTER
1820          LDA XFLAG       ;ADD SPEED TO XSROLL
1830          SEC
1840          SBC SPEED
1850          BPL NEXT2       ;CHECK BIT 8
1860          CLC
1870          ADC #8
1880 NEXT2
1890          STA XFLAG
1900          STA XPOS
1910          LDA XFLAG
1920          SEC
1930          SBC SPEED
1940          BPL NEXT3
1950          INC FLAG1
1960 NEXT3
1970          PLA             ;REMOVE 'JSR' FROM
1980          PLA             ;STACK
1990          JMP IRQOUT      ;JUMP OUT OF IRQ
2000 .END
```

PROGRAM: SPRITE DEMO

```
8B  100 REM ********************
    ********
85  110 REM * DEMONSTRATION OF M
    OVING  *
B9  120 REM * A SPRITE ACROSS TH
    E       *
8E  130 REM * SCREEN USING ROUTI
    NES    *
A9  140 REM * FROM 'ARCADE ACTIO
    N'      *
3D  150 REM *
            *
1F  160 REM * NOTE. THE FOLLOWIN
    G       *
ED  170 REM * PROGRAMS MUST HAVE
     BEEN  *
33  180 REM * RUN BEFORE YOU TRY
     THIS  *
C0  190 REM * DEMO.
            *
77  200 REM *
            *
A0  210 REM *      'IRQ DATABASE'
            *
53  220 REM *      'SPRITE ANIM L
    OAD'    *
A3  230 REM *      'SPRITE MOVER
    LOAD'  *
1F  240 REM ********************
    ********
9D  250 POKE 53280 ,0
6D  260 POKE 53281 ,0
8A  280 PRINT"[CLR,DOWN8,C5,SPC6
    ]SPRITE MOVEMENT DEMONSTRATI
    ON"
40  290 REM *** THIS IS THE SPRI
    TE DATA ***
08  300 REM *** DATA FOR SPRITE
    ONE     ***
0C  310 DATA 0,0,0,0,0,0,0
98  320 DATA 248,56,3,255,244,31
    ,255
A4  330 DATA 255,63,254,56,127,2
    52,0
82  340 DATA 255,248,0,7,248,0,2
    9
00  350 DATA 240,0,1,240,0,3,240
2A  360 DATA 0,3,240,0,3,240,0
91  370 DATA 1,224,0,1,224,0,1
FD  380 DATA 224,0,0,224,0,0,96
BD  390 DATA 0,0,32,0,0,0,0,0
3E  400 REM *** DATA FOR SPRITE
    2       ***
8A  410 DATA 0,0,0,0,128,0,1
66  420 DATA 128,0,3,128,0,7,192
88  430 DATA 0,15,192,0,15,192,0
48  440 DATA 15,192,0,15,224,0,1
    5
80  450 DATA 224,0,7,240,0,7,240
43  460 DATA 0,3,248,56,3,255,24
    4
A5  470 DATA 31,255,255,63,254,5
    6,127
16  480 DATA 252,0,255,240,0,3,1
    92
69  490 DATA 0,14,0,0,0,0,0,0
C2  500 REM *** POKE SPRITE DATA
     INTO   ***
35  505 REM *** SPRITE POSITIONS
```

```
     128/9  ***
34   510 FOR X = 0 TO 127
EC   520 READ A
22   530 POKE X + ( 128 * 64 )
     A
E3   535 NEXT X
6C   550 POKE 2040,128:REM POINTE
     R FOR SPT 0
CA   560 POKE 2041,128:REM POINTE
     R FOR SPT 1
A2   800 SYS 49152:REM TURN ON IR
     Q DBASE
3E   810 POKE 837,1: REM TURN ON
     SPRITE MOVE
91   820 POKE 53269,255:REM ENABL
     E SPRITES
75   830 POKE 53287,15:REM SET SP
     RITE COLOUR
FB   840 SYS 50180,0,20,200,0,3,1
      500:REM     START THE MOVEME
     NT
EB   890 POKE 838,1:REM TURN ON A
     NIMATION
5B   900 SYS 50480,0,128,2,25:REM
      START THE  MOVEMENT OF SPRI
     TE.
```

PROGRAM: DEMO EXTENSION

```
8B   100 REM ********************
     ********
85   110 REM * DEMONSTRATION OF M
     OVING  *
0E   120 REM * AND ANIMATING SPRI
     TES    *
64   130 REM * USING ROUTINES FRO
     M      *
7B   140 REM * 'ARCADE ACTION'.
            *
3D   150 REM *
            *
1F   160 REM * NOTE. THE FOLLOWIN
     G      *
ED   170 REM * PROGRAMS MUST HAVE
      BEEN  *
33   180 REM * RUN BEFORE YOU TRY
      THIS  *
C0   190 REM * DEMO.
            *
77   200 REM *
            *
A0   210 REM *      'IRQ DATABASE'
            *
53   220 REM *      'SPRITE ANIM L
     OAD'   *
A3   230 REM *      'SPRITE MOVER
     LOAD'  *
1F   240 REM ********************
     ********
9D   250 POKE 53280 ,0
6D   260 POKE 53281 ,0
4D   270 PRINT"[CLR]"
8F   280 PRINT"[HOME,DOWN8,C5,SPC
     6]SPRITE ANIMATION DEMO"
DD   290 REM ** SET UP THE SPRITE
      SHAPES **
32   300 FOR I =0 TO 64*3
E1   310 POKE I +( 128 *64 ) ,255

AA   320 NEXT I
72   330 FOR J = 3 TO 358 STEP 80

B7   340 FOR I = 3 TO 21 STEP 3
A8   350 POKE I+J +( 128 *64 ) ,1
     95
42   360 NEXT I
5B   370 NEXT J
18   380 SYS 49152     :REM START T
     HE IRQ
CE   390 POKE 838 ,1 :REM SWITCH
     ON SPT ANIM
2B   400 POKE 837 ,1 :REM SWITCH
     ON SPT MOVE
F2   410 POKE 2040 +I,128
C0   420 POKE 53287+I,I+1:REM SET
      SPT COLOUR
D6   430 POKE 53269,255   :REM SWI
     TCH ON SPT
D2   440 REM ** SET UP NO. OF ANI
     MATIONS ***
3A   450 FOR I = 0 TO 7
CE   460 SYS 50480,I,128,3,I*2+4
3C   470 NEXT I
46   480 REM ** START SPRITES MOV
     ING ***
D6   490 FOR I=0 TO 7
71   500 SYS 50180,I,90,100+I*10,
     0,I,4-(I/2),(I+1)*16
D4   510 NEXT I
```

PROGRAM: IRQ DATABASE

```
07   100 DATA120,162,0,169,0,157,
     63,3,674
81   101 DATA232,224,192,144,248,
     162,0,169,1371
B9   102 DATA0,170,157,0,157,157,
     0,158,799
92   103 DATA157,0,159,232,208,24
     4,169,81,1250
BA   104 DATA157,88,192,169,192,1
     57,89,192,1236
43   105 DATA232,232,232,224,30,1
     44,239,169,1502
38   106 DATA0,141,14,220,169,82,
     141,20,787
76   107 DATA3,169,192,141,21,3,1
     69,0,698
7D   108 DATA141,18,208,169,27,14
     1,17,208,929
2B   109 DATA169,1,141,25,208,141
     ,26,208,919
4A   110 DATA88,96,169,1,141,25,2
     08,32,760
80   111 DATA81,192,32,81,192,32,
     81,192,883
19   112 DATA32,81,192,32,81,192,
     32,81,723
8C   113 DATA192,32,81,192,32,81,
     192,32,834
90   114 DATA81,192,32,81,192,76,
     49,234,937
88   115 DATA120,169,49,141,20,3,
     169,234,905
67   116 DATA141,21,3,169,1,141,1
     4,220,710
47   117 DATA169,121,141,25,208,1
     69,240,141,1214
97   118 DATA26,208,88,96,169,169
     ,173,141,1070
2B   200 POKE 53280 ,0
29   201 POKE 53281 ,0
5C   202 PRINT"[CLR,C5]"
40   203 A$= "[SPC6]"
1A   204 PRINTA$"****************
     **********"
01   205 PRINTA$"*[SPC24]*"
6B   206 PRINTA$"*[SPC4]MAIN IRQ
     PROGRAM[SPC4]*"
A2   207 PRINTA$"*[SPC5]MEM.49152
     -49300[SPC4]*"
06   208 PRINTA$"*[SPC24]*"
2D   209 PRINTA$"*[SPC24]*"
51   210 PRINTA$"*  SYS49152[SPC4
     ]...ON[SPC5]*"
07   211 PRINTA$"*[SPC24]*"
64   212 PRINTA$"*  SYS49153[SPC4
     ]...OFF[SPC4]*"
29   213 PRINTA$"*[SPC24]*"
44   214 PRINTA$"****************
     **********"
39   300 LI =100 :FOR I = 49152 T
     O 49300 STEP8 :T =0 :FOR J =
     0 TO 7 :READ A
E6   301 POKE I+J ,A:T =T +A :NEX
     T J:READ A:IF A<>T THENPRINT
     "ERROR IN LINE "LI :END
05   302 LI =LI +1:NEXT I
```

PROGRAM:MESSAGE LOADER

```
76   100 DATA32,253,174,32,138,17
     3,32,247,1081
3D   101 DATA183,165,20,141,83,15
     8,32,253,1035
03   102 DATA174,32,138,173,32,24
     7,183,165,1144
0C   103 DATA20,201,9,176,35,141,
     82,158,822
9B   104 DATA169,194,141,88,192,1
     69,198,141,1292
D2   105 DATA89,192,162,1,142,80,
     158,162,986
80   106 DATA0,142,79,158,142,81,
     158,189,949
B9   107 DATA0,4,157,84,158,232,2
     08,247,1090
F3   108 DATA96,173,71,3,240,250,
     238,79,1150
CF   109 DATA158,173,79,158,240,3
     9,169,200,1216
A4   110 DATA141,22,208,172,81,15
     8,162,0,944
52   111 DATA173,83,158,157,0,216
     ,185,84,1056
38   112 DATA158,157,0,4,200,232,
     224,40,1015
5E   113 DATA208,238,169,255,141,
     79,158,169,1417
C7   114 DATA255,141,18,208,96,16
     9,58,141,1086
63   115 DATA18,208,173,80,158,56
     ,237,82,1012
E2   116 DATA158,16,3,24,105,8,14
     1,80,535
A2   117 DATA158,141,22,208,173,8
     0,158,56,996
3C   118 DATA237,82,158,16,3,238,
     81,158,973
F3   119 DATA104,104,76,129,234,3
     2,253,174,1106
2B   200 POKE 53280 ,0
29   201 POKE 53281 ,0
5C   202 PRINT"[CLR,C5]"
40   203 A$= "[SPC6]"
1A   204 PRINTA$"****************
     **********"
01   205 PRINTA$"*[SPC24]*"
86   206 PRINTA$"*[SPC5]MESSAGE S
     CROLL[SPC5]*"
B6   207 PRINTA$"*[SPC5]MEM.50817
     -50973[SPC4]*"
06   208 PRINTA$"*[SPC24]*"
BD   209 PRINTA$"* POKE 839  ,1[SP
     C12]*"
28   210 PRINTA$"*[SPC24]*"
BD   211 PRINTA$"* SYS 50817  ,COL
     OUR[SPC6]*"
E7   212 PRINTA$"*[SPC11],SPEED[S
     PC7]*"
29   213 PRINTA$"*[SPC24]*"
44   214 PRINTA$"****************
     **********"
A9   300 LI =100 :FOR I = 50817 T
```

```
   0 50973 STEP8 :T =0 :FOR J =
   0 TO 7 :READ A
E6 301 POKE I+J ,A:T =T +A :NEX
   T J:READ A:IF A<>T THENPRINT
   "ERROR IN LINE "LI :END
05 302 LI =LI +1:NEXT I
```

PROGRAM:MESSAGE DEMO

```
F1 1 REM SWITCH ON IRQ
38 2 :
5E 3 SYS49152
3E 4 :
6D 5 POKE 53281 ,0
B1 6 POKE 53280 ,0
9D 9 REM CLEAR SCREEN
30 10 :
72 11 PRINT"[CLR]";
36 12 :
08 13 REM PRINT MESSAGE
75 14 PRINT"THIS IS THE MESSAGE
    TO BE SCROLLED ACROSS THE T
   OP OF THE SCREEN. ";
0C 15 PRINT"TO DO THIS, FIRST C
   LEAR THE SCREEN. THEN PRINT
   THE MESSAGE 256";
EB 16 PRINT"CHARACTERS LONG. TH
   EN ";
AE 17 PRINT"'SYS50882 ,COLOUR ,
   SPEED'. THEN CLEAR THE SCREE
   N AGAIN. THEN 'POKE ";
A9 18 PRINT"839,1' TO START 'PO
   KE839,0' WILL STOP."
5C 19 SYS50817,7,2:REM SET UP S
   CROLL
5E 20 PRINT"[CLR]"
69 21 POKE839,1    :REM START SC
   ROLL
48 22 PRINT"[HOME,C5,DOWN10,RIG
   HT7]SCROLLING MESSAGE DEMO"
E3 23 GOTO23
```

PROGRAM: PLOT LOADER

```
D0 100 DATA160,0,140,99,159,32,
   253,174,1017
9A 101 DATA32,138,173,32,247,18
   3,165,20,990
EC 102 DATA172,99,159,153,92,15
   9,200,192,1226
20 103 DATA4,144,231,169,124,14
   1,100,192,1105
50 104 DATA169,197,141,101,192,
   173,92,159,1224
2A 105 DATA170,169,1,157,124,15
   9,169,0,949
57 106 DATA157,116,159,157,148,
   159,173,93,1162
4F 107 DATA159,157,100,159,157,
   248,7,173,1160
97 108 DATA94,159,157,140,159,1
   73,95,159,1136
CA 109 DATA157,108,159,96,173,7
   0,3,240,1006
25 110 DATA250,162,0,189,124,15
   9,240,42,1166
69 111 DATA254,116,159,189,116,
   159,221,108,1322
D2 112 DATA159,144,31,169,0,157
   ,116,159,935
33 113 DATA254,148,159,189,148,
   159,221,140,1418
D5 114 DATA159,144,5,169,0,157,
   148,159,941
B5 115 DATA189,100,159,24,125,1
   48,159,157,1061
2A 116 DATA248,7,232,224,8,208,
   204,96,1227
46 117 DATA244,174,86,159,189,1
   13,198,145,1308
56 118 DATA183,76,100,198,142,8
   7,159,173,1118
3B 119 DATA87,159,45,86,159,208
   ,13,173,930
DE 120 DATA87,159,24,109,86,159
   ,170,189,983
0E 121 DATA113,198,145,183,165,
   184,24,105,1117
2E 122 DATA212,133,184,173,90,1
   59,145,183,1279
99 123 DATA96,32,126,124,226,12
   3,97,255,1079
61 124 DATA236,108,127,225,251,
   98,252,254,1551
D7 125 DATA160,32,253,174,32,13
   8,173,32,994
2B 200 POKE 53280 ,0
29 201 POKE 53281 ,0
5C 202 PRINT"[CLR,C5]"
40 203 A$= "[SPC6]"
1A 204 PRINTA$"****************
   **********"
01 205 PRINTA$"*[SPC24]*"
71 206 PRINTA$"*[SPC6]PLOTTER X
   ,Y[SPC7]*"
25 207 PRINTA$"*[SPC5]MEM.50616
   -50816[SPC4]*"
06 208 PRINTA$"*[SPC24]*"
00 209 PRINTA$"* SYS 50616 ,XCO
   -OD[SPC6]*"
0F 210 PRINTA$"*[SPC11],YCO-OD[
   SPC6]*"
39 211 PRINTA$"*[SPC11],COLOUR[
   SPC6]*"
32 212 PRINTA$"*[SPC24]*"
44 214 PRINTA$"****************
   **********"
4C 300 LI =100 :FOR I = 50616 T
   O 50816 STEP8 :T =0 :FOR J =
   0 TO 7 :READ A
E6 301 POKE I+J ,A:T =T +A :NEX
   T J:READ A:IF A<>T THENPRINT
   "ERROR IN LINE "LI :END
05 302 LI =LI +1:NEXT I
```

PROGRAM: PLOT DEMO

```
45 0 POKE53280,0
9F 1 POKE53281,0
1C 2 PRINT"[CLR,C5,DOWN12]"TAB(
   13)"LO-RES PLOTTER"
AB 3 FORI=24TO55
4C 4 SYS 50616,I,22,12
B2 5 SYS 50616,I,27,12
84 6 NEXT
AA 7 FORI=22TO27
5A 8 SYS50616,24,I,12
71 9 SYS50616,55,I,12
88 10 NEXT
65 11 FORJ =11TO23STEP3
1E 12 FORI=0TO2*[PI]STEP.5/J
1E 13 A=40-SIN(I)*J*1.7
06 14 B=25-COS(I)*J
C0 15 SYS 50616,A,B,J
DB 16 NEXTI
DD 17 NEXTJ
F4 18 GOTO18
```

```
1000 ;******************************
1010 ;****LOW-RES GRAPHIC PLOTER****
1020 ;******************************
1030 ;
1040 BASIC1  = 44797
1050 BASIC2  = 44426
1060 BASIC3  = 47095
1070 PAGE    = 20
1080 PAGE1   = 183
1090 TEST1   = 40790
1100 TEST2   = 40791
1110 YSTORE  = 40792
1120 XSTORE  = 40793
1130 COLOUR  = 40794
1140 *       = 50616
1150 ;
1160 ;
1170 PROG1
1180         JSR BASIC1     ;GET X CO-OD
1190         JSR BASIC2
1200         JSR BASIC3
1210         LDA PAGE
1220         STA XSTORE
1230         CMP #80        ;CHECK FOR MAX
1240         BCS ERROR
1250         JSR BASIC1     ;GET Y CO-OD
1260         JSR BASIC2
1270         JSR BASIC3
1280         LDA PAGE
1290         STA YSTORE
1300         CMP #50        ;CHECK FOR MAX
1310         BCS ERROR
1320         JSR BASIC1     ;GET COLOUR
1330         JSR BASIC2
1340         JSR BASIC3
1350         LDA PAGE
1360         STA COLOUR
1370         JMP LOOP8
1380 ERROR
1390         RTS
1400 LOOP8
1410         LDA #0         ;EVAL BITS
1420         STA TEST1
1430         STA TEST2
1440         LSR YSTORE
1450         ROR TEST1
1460         LSR XSTORE
1470         ROR TEST2
1480         LDA #1         ;FIND BYTE
1490         LDX TEST2
```

```
1500           BEQ LOOP1
1510           ASL A
1520 LOOP1
1530           LDX TEST1
1540           BEQ LOOP2
1550           ASL A
1560           ASL A
1570 LOOP2
1580           STA TEST1
1590           LDA #0
1600           STA PAGE1
1610           LDA #4
1620           STA PAGE1+1
1630           LDY YSTORE        ;FIND SCREEN
1640 LOOP4                       ;LOCATION
1650           BEQ LOOP9
1660           LDA PAGE1
1670           CLC
1680           ADC #40
1690           STA PAGE1
1700           BCC LOOP3
1710           INC PAGE1+1
1720 LOOP3
1730           DEY
1740           JMP LOOP4
1750 LOOP9
1760           LDY XSTORE        ;FIND OUT WHATS
1770           LDX #0            ;ON SCREEN
1780 LOOP5
1790           LDA (PAGE1),Y
1800           CMP DATA,X
1810           BEQ LOOP6         ;FOUND IT
1820           INX
1830           CPX #16
1840           BNE LOOP5
1850           LDX TEST1
1860           LDA DATA,X
1870           STA (PAGE1),Y
1880           JMP LOOP7
1890 LOOP6
1900           STX TEST2
1910           LDA TEST2         ;COMPARE WITH
1920           AND TEST1         ;NEW DATA
1930           BNE LOOP7
1940           LDA TEST2
1950           CLC
1960           ADC TEST1
1970           TAX
1980           LDA DATA,X        ;ADD TOGETHER
1990           STA (PAGE1),Y     ;STORE ON SCREEN
2000 LOOP7
2010           LDA PAGE1+1
2020           CLC
2030           ADC #212
2040           STA PAGE1+1
2050           LDA COLOUR        ;STORE COLOUR ON
2060           STA (PAGE1),Y     ;COLOUR SCREEN
2070           RTS
2080 ;
2090 ;
2100 DATA
2110 .BYT 32,126,124,226,123,97,255,236
2120 .BYT 108,127,225,251,98,252,254,160
2130 .ENDI
```

Cut Price Disks from Direct Disk Supplies

from only £10.99 for 25 disks delivered to your door.



Cash 'n Carry prices on disks from Direct Disk Supplies

OFFER 1 Premium Universals *One disk for all reasons!*

The Premium Universal disk tested to DSDD 96tpi – suitable for all drives needing high quality media. (SSDD, DSDD 40/80 track)

25 disks	£ 14.99
50 disks	£ 27.99
100 disks	£ 49.99
200 disks	£ 96.99
250 disks	£119.99
500 disks	£229.99
1000 disks	£399.99

Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

ALL PRICES INCLUDE VAT & DELIVERY TO YOUR DOOR! NO HIDDEN EXTRAS

OFFER 2 Rainbows

Sets of 5 colours in each pack. Universal coloured disks to code your files and programs. Without doubt the best value coloured disks on the market. (SSDD, DSDD 40/80 track)

25 disks	£ 18.99
50 disks	£ 35.99
100 disks	£ 69.99
200 disks	£129.99
250 disks	£149.99
500 disks	£279.99
1000 disks	£499.99

Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

OFFER 3 Flippies

This is the disk for turning!
Reversible disk tested both sides. 2 notches and 2 index holes. Ideal for BBC, APPLE, Commodore etc.

25 disks	£ 18.99
50 disks	£ 35.99
100 disks	£ 69.99
200 disks	£129.99
250 disks	£149.99
500 disks	£279.99
1000 disks	£499.99

Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

OFFER 4 HIgrade Doubles & PC Preformatted

	HIgrade Doubles	PC Formatted
25 disks	£ 12.99	£ 18.99
50 disks	£ 23.99	£ 35.99
100 disks	£ 45.99	£ 69.99
200 disks	£ 89.99	£129.99
250 disks	£105.99	£149.99
500 disks	£199.99	£279.99
1000 disks	£359.99	£499.99

Premium quality, individually certified to DS 48tpi. Made for the PC, giving premium quality at budget prices.

Why not spoil yourself, and buy them formatted – a little extra saves a lot! There's never a disk formatted when you need it.

OFFER 5 Bargain Box

Price per order qty.		Approx price per disk ex-VAT (infor only)
20 disks	£ 10.99	.48
40 disks	£ 19.99	.44
60 disks	£ 28.99	.42
80 disks	£ 36.99	.40
100 disks	£ 42.99	.38
200 disks	£ 82.99	.36
500 disks	£199.99	.35
1000 disks	£389.99	.34

Branded SCOTCH (made by 3M) SSDD 48tpi at prices below other people's plain label. Certified error free and tested by 3M; disks have hub-rings, tyvek envelopes and labels.

Stocks are decreasing rapidly, these have been extremely popular.

OFFER 6 – 3.5" Media Life Disks

Qty	SS	DD
10	£ 13.99	£ 15.99
20	£ 26.99	£ 29.99
50	£ 64.99	£ 73.99
100	£119.99	£ 139.99
200	£229.99	£ 269.99
250	£279.99	£ 329.99
400	£429.99	£ 519.99
500	£499.99	£ 599.99
1000	£949.99	£1099.99

NEW LOWER PRICES

3.5" disks in plastic library boxes.

Made by a leading manufacturer, all our disks are individually certified to 135tpi.

Don't forget the price includes VAT, delivery and library boxes!

OFFER 7 3M & Verbatim

5.25" disks	3M/Verb		
SSDD 48tpi	744/525	20 disks	£25.99
DSDD 48tpi	745/550	20 disks	£29.99
DSDD 96tpi	747/557	20 disks	£37.99
DSHD 96tpi	799/HD	20 disks	£49.99
3.5" disks			
SSDD 135tpi		20 disks	£39.99
DSDD 135tpi		20 disks	£49.99
DSDD High Density		10 disks	£49.99

Includes VAT and delivery.

Brand Leaders at Cash 'n Carry prices

If these are your favourite, then don't miss our CRAZY low prices for 20 disks. Remember there's no extras, just terrific value.

Same day despatch – at no extra cost

OFFER 8 HI-flyers

PC-AT High Density Disks made by one of our major manufacturers. Suitable for PC-AT and other High Density drives. Lifetime warranty.

Total price (no extras)

20 disks	£ 32.99
40 disks	£ 62.99
60 disks	£ 89.99
80 disks	£119.99
100 disks	£139.99
200 disks	£259.99
500 disks	£599.99

OFFER 9 3" CF2 disks

Maxell or Panasonic 3" CF2 disks

10 disks	£ 25.99
20 disks	£ 49.99
50 disks	£109.99
100 disks	£209.00

VAT & carriage included.

OFFER 10 Box Clever

Safe! Clean! Tidy!

Sixers – 6 stylish plastic library cases for 10 disks. VAT & carriage included.

3.5"	Slimpak	£8.99
5.25"	Vision-10	£8.99

Lockable Boxes

3.5"	TDS040	40/50 disk box	£ 9.99
	TDS080	80/90 disk box	£12.99
5.25"	TDS050	50 disk box	£ 9.99
	TDS100	100 disk box	£12.99
IBM parallel printer cable			£9.99

VISA Access

How to order

1. DIAL-A-DISK ON 01-979 7811, and give your ACCESS or VISA number and expiry date.
2. Send your cheque etc. to Direct Disk Supplies Ltd.,
3. Official Orders, Bona-fide orders from Universities, Colleges, Schools, Charities, etc are very welcome.
4. Cash orders, no minimum value. Account orders, minimum value £30.

DIAL-A-DISK 01-979 7811

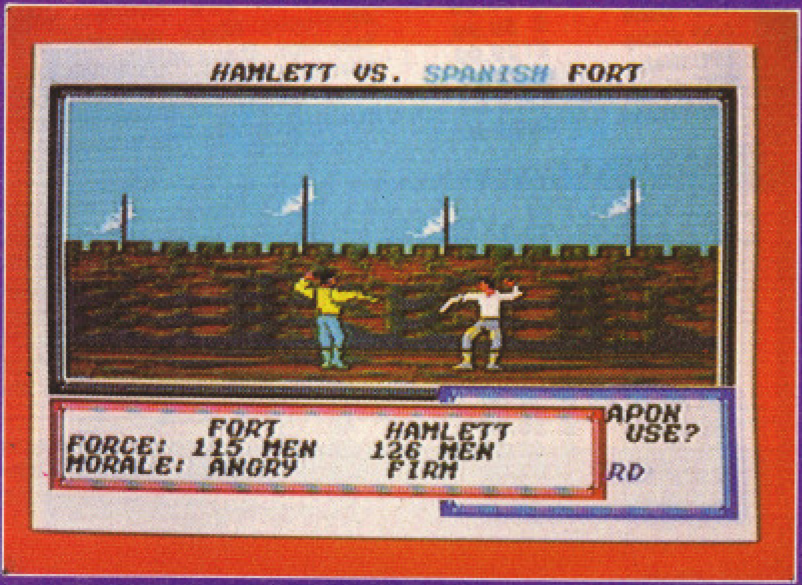
Direct Disk Supplies Ltd.

Dept YC, FREEPOST, 129 High Street, Hampton Hill, Middlesex TW12 1BR

GAME OF THE MONTH

Pirates

If it's excitement and danger on the high seas that you're after, look no further than the latest release from Microprose.



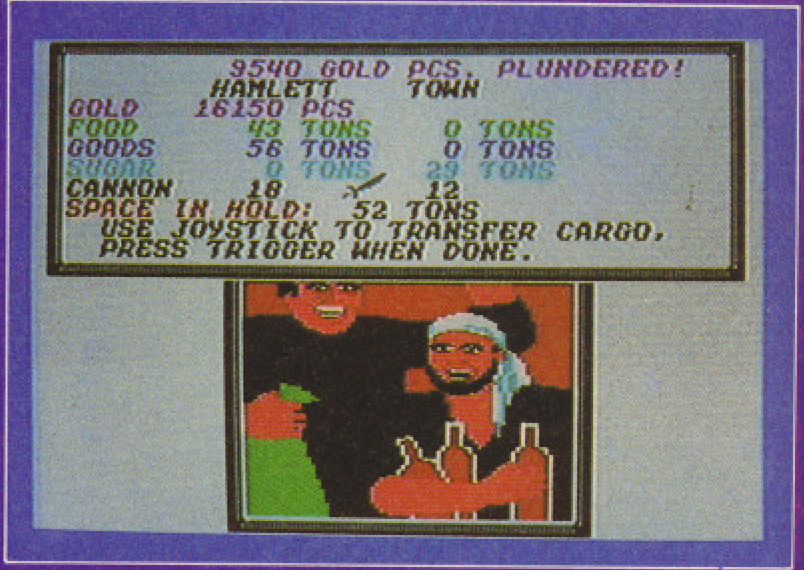
Avast behind! No, it's not a reference to the size of the Editor but Pirates, the swashbuckling game of derring-do and blood and thunder (or, in my case, thud and blunder) from those masters of the simulation – Microprose.

It is the seventeenth century and like many of your compatriots, you decide to seek your fame and fortune on the high seas. Just how your career develops is up to you. Maybe you fancy becoming an outright pirate, plundering anything that you can get your hands on, regardless of its country or origin. Or perhaps you would rather serve King and Country (England, France, Holland or Spain) as a privateer; in which case you act as a sort of legalised pirate, providing you only plunder the enemy. Should you have delusions of grandeur, you can try and emulate the feats of some of history's greatest mariners – Francis Drake or Henry Morgan for example, although only the experienced should apply.

Your business in the West Indies has failed and you decide to sign up on a ship and seek alternative fortune. The skill level you choose determines how well your future crews will behave but also how big your share of the plunder will be. You also get the chance to specialise in one particular skill such as fencing, navigation, gunnery, wit and charm or medicine. Fencing is strongly recommended for beginners. Your first trip as a crew member goes well and the crew suggest getting rid of the old captain and elevating you. The dispute is settled in the time honoured way – a duel. You win, and it's not too difficult, and you assume command of your first ship.

The real game starts off in a friendly port. Here you can pick up the latest gossip, sell your plunder, recruit new crew and visit the Governor. He will give you a quick run down on the main political news, i.e. who you are at war with and will invite you to go out and sink a few of the enemy's ships. The tavern is a source of more specific gossip, e.g. which towns have been hit by disease, where the latest silver deposits have been found and so on. These nuggets of information influence your strategy as you decide which areas to explore.

After gleaning all the information you can, you will want to sign up a crew and set sail as quickly as possible. Although you are provided with a map of the Spanish Main, you must still learn the principles of navigation. Each type of ship behaves differently in the wind and you will have to discover how to make the best speed when the winds are against you. Get it wrong and you may run out of supplies and end up with a mutinous crew.



Sooner or later, your lookout will report a sail on the horizon. All you know is whose waters you are in, so you will probably want to go in closer and investigate. Chances are that she will be Spanish (assuming of course that you are playing a Brit). She may also be a pirate ship, Dutch or French.

Eager for some action, you decide to close for battle. The two ships are displayed on the battle screen together with



their relative strengths. You have three basic choices in battle. You can try and sink the enemy, you can try and ram her with the intention of boarding her or you can run away. The battle develops into a cat and mouse struggle as each ship tries to make the best use of the changing winds, raising and lowering sails, getting square on, in order to fire a broadside or getting close enough to board. What ship you have is important here. A galleon may offer you a lot of protection but you will find that other lighter ships will be able to run rings round you.

Obviously, if you sink a ship, you don't get too much chance to do some plundering so the trick is to damage her so much that she surrenders when you sail close. Failing that, you will have to board her. A good captain always leads from the front and you must engage the enemy captain in a sword fight. How well you do reflects on the morale of the crew so it is important to hone your fencing skills.

You have a choice of three weapons – rapier, long sword and cutlass. The cutlass does most damage but you do have to be close to your opponent, whereas with the rapier, you can keep your man at long range but have to hit him an awful lot of times. Attacking moves include thrusting and slashing at high, mid and low levels. The slash does more damage if it connects but gives your opponent a lot more time to counter. If you win, the enemy captain goes down on his knees and surrenders his ship to you and of course, being a gentleman, you accept. Far be it from me to tell tales but the editor of this journal, cad that he is did insist on hitting the enemy when they were on their knees begging for mercy.

As well as plundering a capture ship, you have the choices of sinking her or taking her along with you. Obviously, the latter action is better as you can increase your effective hold capacity and later sell the ship but make sure that you have enough crew to man both vessels.

Ships are not your only target – you can attack towns as well. This involves sailing your ship close enough to the town's fort before the enemy blows you out of the water. Your men can then land and you get to fight the Governor.

Alternatively, you can attack a town by land. This involves a completely different set of tactics. You have two or three groups of men to control as they attempt to make best use of the available terrain as you lure the city's defenders into battle.

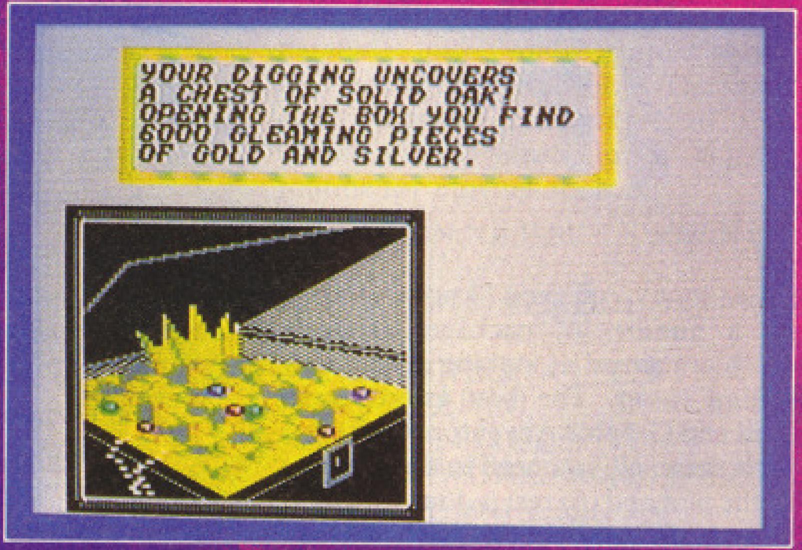
Naturally, you will want to capitalise on your newfound wealth, but remember that the crew want their share too. Sail into a friendly port, sell your goods and divide the plunder. This will mark the end of a particular voyage and your crew will automatically disband. To keep your reputation high, it is important to have a lot of gold to give out so use this option sparingly.

Depending on your successes, you get promoted by the various governors. Elevation in rank and a few acres of land all help add to your wealth and make for a happy retirement. You also get the chance to chat up the Governors' daughters with a view to finding yourself a wife.

Other quests meander through the game. Your sister usually manages to get herself kidnapped and you have to find the man who did it and duel for maps leading to her whereabouts. There are also treasure maps to be bought and more ill-gotten gains to be found.

Not every cruise ends in success though. You may lose a battle and be imprisoned for as long as it takes for someone to decide that you are worth paying a ransom for. Lose a ship through carelessness and you will be stranded on some uncharted island until a friendly ship happens to pass by. Eventually, the passage of time and the old war wounds take their toll and you are forced to retire. At this point, your rating is worked out based on treasure, land and titles accumulated over the years.

The best thing about Pirates is that even though it is a game on a huge scale, it is very easy to get into – unlike certain other simulations. There is no need to be aware of all the political implications at the beginning of the game



although you will want to later on in order to maximise your profits. The game is simplicity itself to control and there are some nice graphics in the non-sailing scenarios. Documentation in the form of a ninety page book is excellent. My only reservation is that I am not sure how well the cassette version of the game will play as disk access is frequent.

Pirates is a superb simulation. It is difficult to think of anything else that could have been included. Deceptively simple, it is only when you play for an extended period that you begin to recognise the subtlety of the tactics involved.

G.R.H.

Touchline:
Title: *Pirates.* ***Supplier:*** *Microprose, 2 Market Place, Tetbury, Gloucestershire GL8 8DA.* ***Tel:*** *0606 54326.* ***Machine:*** *C64.* ***Price:*** *£14.95 (cas), £19.95 (d).* ***Originality:*** *9/10.* ***Graphics:*** *7/10.* ***Playability:*** *9/10.* ***Value:*** *9/10.*

YC

Adventure Kit

Want to write a gripping adventure? This series will provide a kit of machine code routines which will simplify the procedure and enable you to develop an individual style. We start off with the location/exit module.

As many of you know, there are a number of packages around which are aimed at making adventure writing easier. The best known are Quill and Graphic Adventure Creator. With these, all you need to do is think up the plot and the rest is done for you. The main drawback with these products however, is that the adventures written with them tend to have a similar feel and you are constrained by the imposed limitations of each package.

In essence an adventure is a data base which is accessed during the game. The tedious part is the need for efficient and rapid access of the data held in it. This apsect will be tackled by this kit. This will leave you more time to work on the flow of the game and the addition of embellishments

The kit comprises of six modules:

1. A location/exit module which allows the handling of the geography of the adventure.
2. A text module which handles messages, location descriptions, etc.
3. An object module which eases such actions as taking, dropping, eating, drinking objects, looking and inventory.
4. A parser allowing the input of commands and the checking of words against a vocabulary.
5. A window module allowing the manipulation of screen windows so that you can erase or scroll different text areas.
6. An interrupt module which will build in a real time element into the game.

Naturally you don't get something for nothing. The machine code will steal about 8K leaving you about 30K for BASIC. The routines will, however, give you instant access to 20K of memory for the game database.

Each module will be accompanied with an editor allowing you to set up the data base. However, I'll go through the setting up of an editor in sufficient detail to allow you to write your own.

Location Exit module

All adventures need some way of giving you the power to move about. This is done by using locations. Each location may be considered to be a room or cell linked to its neighbours by routes. It is necessary to specify two sets of data:

a) which exits each location has;
b) where each location leads to.

This month I will deal with the first set of data and cover the second set at a later date.

Ten possible exits are available for any given location. These are the eight basic compass directions and up and down. These are described in two bytes for each location. The first byte has a bit allocated for each compass bearing.

North occupies bit 0, north-east occupies bit 1 and so on. This information is held in a table of 256 bytes residing between 37632 and 37887 ($9300-$93FF). Location 0 uses the first byte in the table (37632) and location 255 uses the last byte (37887). Up and down use the first two bits of

bytes stored in a table from 37888 to 38143 ($9400-$94FF). This works in the same way as the other table.

The destination data occupies rather more memory. Each location has ten bytes reserved for it. These hold the number of the location reached when moving in any of the ten possible directions. If no such route exists, the byte value will be zero by default (more on that later). The table starts at $9500 (38144) and occupies as much memory as required by the number of locations used. If a full complement of 256 locations is used, the table will end at $9F00 (40704). Location 0 uses the first ten bytes, location 1, the next ten and so on.

The code in this module uses these tables to provide four functions. This routine prints the exits in any given location on the screen. The syntax of the command is:

SYS 36864, LOCNO, PRINTTYPE,X,Y

LOCNO is the location number.
PRINTTYPE specifies the form of the display. Type 0 prints the exits across the screen using commas to separate them.
Type 1 prints the exits in a column in a form suitable for use in a window.
X is the horizontal position of the top left corner of the output. It is ignored by type 0 output.
Y is the vertical position of the output.

EXITCHK

This checks whether an exit exists. if there is not an exit, location 900 will contain a zero. If the exit does exist, it will contain 255. Its syntax is:

SYS 36867,LOCNO,DIRECTION

LOCNO is as before
DIRECTION specifies the direction you want to move:
0...North
1...North-east
2...East
3...South-east
4...South
5...South-west
6...West
7...North-west
8...Up
9...Down

An example of its use would be:

```
1000 SYS 36867,LN,DI
1010 IF PEEK(900)=0 THEN PRINT
"YOU CAN'T GO THAT WAY"
```

CHANGE

This allows you to create or remove an exit during the game. Its syntax is:

SYS 36870,LOCNO,DIRECTION, ACTION

LOCNO and DIRECTION are as before.
ACTION specifies what will happen. A value of 0 closes the exit and a value of 1 creates an exit. An example of its use is:

```
2000 SYS 36870,3,2,1: PRINT "A
ROCKFALL SEALS THE
PASSAGE TEST"
```

CHKDEST

This command checks the destination reached if you were to move in a specified direction. The number of the destination is held in location 901. The syntax of the command is:

SYS 36873,LOCNO,DIRECTION

The routine does not check whether an exit exists, you must do that. The following code fragment assumes that your current location is in LO and attempts to MOVE you in direction DI:

```
100 SYS 36867,LN,DI
110 IF PEEK(900)=255THEN
PRINT "YOU CAN'T GO THAT
WAY": RETURN
RETURN
120 SYS 36873,LO,DI: LO=PEEK
(901): RETURN
```

The code is provided as a normal BASIC loader but you will no doubt wish to save it as object code. For those of you with machine code monitors, save the block from $9000 to $92D2. The editor includes a small saving routine which can be used for the job. What you do is:

1) RUN the editor and select the SAVE option.
2) When prompted for the file name, break out of the editor with RUN STOP/RESTORE.
3) Give the command:

SYS 870 filename,8,2,36864,37586
if you are a disk user or

SYS 870 filename,1,2,36864,37586

for cassette.

The resulting code can be loaded directly by:

LOAD filename,8,1 or LOAD filename,1,1

The editor is menu driven and therefore self-explanatory. A few points should, however, be made.

The initialise tables option fills the data tables with zero bytes. Since the destination table is of variable size, you must specify the highest location to be used. This value is used to decide how much memory must be saved later. The program does not save the number of locations. You must remember it since you will be prompted for its value when you use the LOAD option.

The display location option lists the destination and exit entries for the specified location. The set up option allows you to specify the exits and destinations. You should set up the exits first. The destination portion will then ask you to specify the destination for each available exit.

If you plan to create an exit during the game, use the editor to create the exit and the destination and then use the editor to close the exit. The destination entry will be retained for when you need it.

The thing to remember is that you should plan everything on paper before using the editor. Changing databases once you've started work may not always be possible. The final code fragment pulls three of the commands together in a simple routine for moving about.

```
10 DATA N,NE,E,SE,S,SW,W,NW,
W,U,D
20 FOR I=0T09:READDI$(I):NEXT
30 LO=1
40 PRINT CHR$(147):PRINT
"LOCATION"LO
50 SYS 36864,LO,0,0,5
60 INPUT"WHICH WAY";DI$:I=0
70 IFDI$=DI$(I) THEN 100
80 I=I+1: IFI<10THEN70
90 GOTO60
100 SYS 36867,LO,I:IFPEEK(900)=0
THEN PRINT "YOU CAN'T GO
THAT WAY":GOTO60
100 SYS36873,LO,I:LO=PEEK(901):
GOTO 40
```

That's all for now, next time I will look at text storage.

```
PROGRAM: EXIT.MOD.LOADER

38  2000 FORL=0TO45:CX=0:FORD=0T
    O15:READA:CX=CX+A:POKE36864+
    L*16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"
    ERROR IN LINE";2040+(L*10):S
    TOP
0F  2020 NEXTL:END
D5  2040 DATA76,12,144,76,36,146
    ,76,79,146,76,157,146,32,86,
    145,141,1574
EC  2050 DATA72,3,32,86,145,141,
    73,3,32,86,145,141,74,3,32,8
```

```
     6,1154
3F   2060 DATA145,141,75,3,169,0,
     141,132,3,173,73,3,240,102,3
     2,20,1452
8A   2070 DATA146,169,118,160,145
     ,32,30,171,172,72,3,185,0,14
     7,141,76,1767
45   2080 DATA3,201,255,208,21,18
     5,0,148,201,3,208,14,238,75,
     3,32,1795
56   2090 DATA20,146,169,145,160,
     145,32,30,171,96,162,0,78,76
     ,3,142,1575
5D   2100 DATA77,3,144,3,32,14,14
     5,232,224,8,208,240,174,72,3
     ,189,1768
DB   2110 DATA0,148,141,76,3,162,
     8,78,76,3,142,77,3,144,3,32,
     1096
1C   2120 DATA14,145,232,224,10,2
     08,240,173,132,3,208,7,169,2
     49,160,145,2319
FC   2130 DATA32,30,171,96,169,0,
     141,74,3,32,20,146,169,100,1
     60,145,1488
AC   2140 DATA32,30,171,238,75,3,
     32,20,146,172,72,3,185,0,147
     ,141,1467
65   2150 DATA76,3,201,255,208,15
     ,185,0,148,201,3,208,8,169,1
     26,160,1966
91   2160 DATA145,32,30,171,96,16
     2,0,78,76,3,142,77,3,144,3,3
     2,1194
40   2170 DATA40,145,232,224,8,20
     8,240,174,72,3,189,0,148,141
     ,76,3,1903
8E   2180 DATA162,8,78,76,3,142,7
     7,3,144,3,32,40,145,232,224,
     10,1379
8C   2190 DATA208,240,169,157,32,
     210,255,169,32,32,210,255,16
     9,13,32,210,2393
03   2200 DATA255,173,132,3,208,7
     ,169,249,160,145,32,30,171,9
     6,238,75,2143
12   2210 DATA3,32,20,146,174,77,
     3,189,165,145,168,189,155,14
     5,32,30,1673
37   2220 DATA171,174,77,3,238,13
     2,3,96,32,31,146,152,174,77,
     3,24,1533
7F   2230 DATA125,2,146,201,40,14
     4,6,238,75,3,32,20,146,174,7
     7,3,1432
34   2240 DATA189,165,145,168,189
     ,155,145,32,30,171,169,44,32
     ,210,255,174,2273
5B   2250 DATA77,3,238,132,3,96,3
     2,253,174,32,138,173,32,247,
     183,165,1978
C1   2260 DATA20,164,21,96,84,72,
     69,82,69,32,65,82,69,32,69,8
     8,1114
91   2270 DATA73,84,83,58,13,0,69
     ,88,73,84,83,58,13,0,73,78,9
     30
24   2280 DATA32,65,76,76,32,68,7
     3,82,69,67,84,73,79,78,83,13
     ,1050
ED   2290 DATA0,65,76,76,32,87,65
     ,89,83,13,0,175,181,192,197,
     208,1539
6E   2300 DATA214,225,230,241,244
     ,145,145,145,145,145,145,145
     ,145,145,145,78,2682
57   2310 DATA79,82,84,72,0,78,79
     ,82,84,72,45,69,65,83,84,0,1
     058
EA   2320 DATA69,65,83,84,0,83,79
     ,85,84,72,45,69,65,83,84,0,1
     050
B5   2330 DATA83,79,85,84,72,0,83
     ,79,85,84,72,45,87,69,83,84,
     1174
B2   2340 DATA0,87,69,83,84,0,78,
     79,82,84,72,45,87,69,83,84,1
     086
A3   2350 DATA0,85,80,0,68,79,87,
     78,0,78,79,87,72,69,82,69,10
     13
5C   2360 DATA0,13,5,10,4,10,5,10
     ,4,10,2,4,1,2,4,8,92
66   2370 DATA16,32,64,128,174,75
     ,3,172,74,3,24,32,240,255,96
     ,56,1444
46   2380 DATA32,240,255,96,32,86
     ,145,141,72,3,32,86,145,172,
     72,3,1612
B3   2390 DATA170,201,8,176,16,18
     5,0,147,61,12,146,201,0,240,
     2,169,1734
DE   2400 DATA255,141,132,3,96,56
     ,233,8,170,185,0,148,76,56,1
     46,32,1737
D7   2410 DATA86,145,141,72,3,32,
     86,145,141,78,3,32,86,145,14
     1,79,1415
E6   2420 DATA3,172,72,3,173,78,3
     ,201,8,176,11,170,185,0,147,
     32,1434
B1   2430 DATA132,146,153,0,147,9
     6,56,233,8,170,185,0,148,32,
     132,146,1784
51   2440 DATA153,0,148,96,141,76
     ,3,173,79,3,240,7,173,76,3,2
     9,1400
5A   2450 DATA12,146,96,169,255,5
     6,253,12,146,45,76,3,96,32,8
     6,145,1628
A1   2460 DATA141,72,3,32,86,145,
     141,78,3,172,72,3,169,0,133,
     251,1501
65   2470 DATA169,149,133,252,192
     ,0,240,16,24,165,251,105,10,
     133,251,165,2255
24   2480 DATA252,105,0,133,252,1
     36,208,240,172,78,3,177,251,
     141,133,3,2284
3C   2490 DATA96,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,96
```

PROGRAM: EXIT.MOD.EDITOR

```
D8   1 REM******************
CB   2 REM* ADVENTURE KIT *
A3   3 REM*  EXIT EDITOR  *
15   4 REM******************
95   10 IFA=1THENA=2:LOADFI$,DE,1

A5   20 IFA=2THEN 60
A0   30 POKE56,9*16:CLR
1E   40 POKE53280,0:POKE53281,0:S
     A=9*4096:L1=1274
6A   50 BL$="[SPC39]"
75   55 DI$(0)="NORTH":DI$(1)="NO
     RTHEAST":DI$(2)="EAST":DI$(3
     )="SOUTHEAST"
90   56 DI$(4)="SOUTH":DI$(5)="SO
     UTHWEST":DI$(6)="WEST":DI$(7
     )="NORTHWEST"
31   57 DI$(8)="UP":DI$(9)="DOWN"

6D   60 PRINT"[CLR]"TAB(13)"[C8]A
     DVENTURE KIT"
07   70 PRINTTAB(13)"[SD13]"
90   80 PRINT"[DOWN]"TAB(14)"[YEL
     LOW,RVSON]EXIT EDITOR[RVSOFF
     ]"
C0   90 PRINT"[DOWN2]"TAB(10)"[WH
     ITE]1 INITIALISE TABLES"
33   100 PRINTTAB(10)"2 SET UP A
     LOCATION"
69   110 PRINTTAB(10)"3 DISPLAY A
      LOCATION"
4E   120 PRINTTAB(10)"4 SAVE TABL
     ES"
DA   130 PRINTTAB(10)"5 LOAD TABL
     ES"
2E   140 PRINT"[DOWN2]"TAB(14)"[C
     8]SELECT OPTION"
ED   150 GETI$:IFI$<"0"ORI$>"5"TH
     EN150
DA   160 I=VAL(I$)
4B   170 ON I GOTO 175,1000,450,5
     30,630
2E   175 PRINT "[CLR]WHAT IS THE
     HIGHEST LOCATION NUMBER"
6F   176 INPUT"TO BE USED";LL
2C   180 PRINT"[CLR]INITIALISING.
     ......"
08   190 FOR I=37632 TO 38143: PO
     KE I,0:NEXT:
CA   195 FORI=0TO(LL*10)+10:POKE3
     8144+I,0:NEXT:GOTO30
1A   200 INPUT"[CLR]LOCATION NUMB
     ER";LO
56   210 B1=PEEK(37632+LO):B2=PEE
     K(37888+LO)
F5   220 PRINT"[CLR]LOCATION";LO
BD   230 PRINT"[DOWN2]"TAB(9)"[SP
     C3]N[SPC3]S[SPC3]S[SPC3]N U
     D"
CF   240 PRINTTAB(9)" N E E E S W
      W W P N"
48   250 PRINTTAB(9)"[CA,S*,CR,S*
     ,CR,S*,CR,S*,CR,S*,CR,S*,CR,
     S*,CR,S*,CR,S*,CR,S*,CS]"
EE   260 PRINTTAB(9)"[S-] [S-] [S
     -] [S-] [S-] [S-] [S-] [S-]
     [S-] [S-] [S-]"
8C   270 PRINTTAB(9)"[CZ,S*,CE,S*
     ,CE,S*,CE,S*,CE,S*,CE,S*,CE,
     S*,CE,S*,CE,S*,CE,S*,CX]"
48   280 FORI=0TO9:POKEL1+54272+I
     *2,1:NEXT
40   290 PRINT"[DOWN9,WHITE,YELLO
     W,RVSON]S[RVSOFF] SET EXIT
     [RVSON]C[RVSOFF] REMOVE EXIT
       [RVSON]←[RVSOFF] TO EXIT"
08   300 PRINT"LEFT AND RIGH CURS
     OR KEYS TO MOVE CURSOR"
19   310 PRINT"[RVSON]^[RVSOFF] E
     DIT ANOTHER LOCATION[C8]"
65   320 GOSUB670
A5   330 SYSSA,LO,0,0,10
1E   340 PL=L1
C1   350 GETI$:IFI$<>""THEN380
1D   360 LC=PEEK(PL):POKEPL,PEEK(
     PL)OR128:FORD=1TO100:NEXT
AF   370 POKEPL,LC:FORD=1TO100:NE
     XT:GOTO350
62   380 IF I$="[RIGHT]"ANDPL<L1+
     18 THEN PL=PL+2:GOTO350
30   390 IF I$="[LEFT]"ANDPL>L1 T
     HEN PL=PL-2:GOTO350
BF   400 IFI$="C"THENPOKEPL,87:GO
     SUB740:GOTO360
FD   410 IF I$="←"THEN60
A9   420 IFI$="S"THENPOKEPL,81:GO
     SUB740:GOTO360
BD   430 IFI$="^"THEN1000
86   440 GOTO350
4A   450 INPUT"[CLR]INPUT LOCATIO
     N";LO
BD   451 PRINT"[YELLOW]DIRECTION[
     SPC7]DESTINATION[DOWN]"
2A   452 FORI=0TO9:PRINTDI$(I):NE
     XT
```

```
DB  457 PRINT"[HOME,DOWN2]":FORI
    =0TO9:SYSSA+9,LO,I:PRINTTAB(
    18)PEEK(901):NEXT
DE  460 PRINT"[WHITE]": SYS SA,L
    O,0,0,15
DD  470 PRINT:PRINT"[DOWN2]"TAB(
    8)"[C7,RVSON]^[RVSOFF] DISPL
    AY ANOTHER LOCATION"
16  480 PRINTTAB(12)"[RVSON]←[RV
    SOFF] EXIT TO MAIN MENU[C8]"

1F  490 GET I$:IFI$=""THEN 490
2F  500 IFI$="^"THEN450
D7  510 IFI$="←"THEN60
BE  520 GOTO490
A1  530 RESTORE: FOR I=870 TO 92
    4: READ X: POKEI,X: T=T+X:NE
    XT
3F  540 IF T<>5940 THEN PRINT"DA
    TA ERROR": END
85  550 PRINT"[CLR]PLEASE NOTE L
    AST LOCATION USED IS";LL
49  555 INPUT "INPUT FILE NAME";
    FI$
ED  560 INPUT"[DOWN]DEVICE (8=DI
    SK...1=CASSETTE)";DE
1B  570 PRINT"[DOWN3]SAVING TABL
    ES ......."
D6  580 SYS 870 FI$,DE,2,37632,3
    8154+LL*10
FF  590 GOTO 60
55  600 DATA 32,212,225,32,253,1
    74,32,138,173,32,247,183,165
    ,20,72,165,21,72,32,253
```

```
CA  610 DATA 174,32,138,173,32,2
    47,183,165,1,41,254,133,1,16
    6,20,164,21,104,133,21
C1  620 DATA 104,133,20,169,20,3
    2,95,225,165,1,9,1,133,1,96
51  630 INPUT "[CLR]LAST LOCATIO
    N USED";LL
B9  635 INPUT "INPUT FILE NAME";
    FI$
7D  640 INPUT"[DOWN]DEVICE (8=DI
    SK...1=CASSETTE)";DE
F3  650 PRINT"[DOWN3]LOADING TAB
    LES ......."
9C  660 A=1:GOTO10
3B  670 FOR I=0TO9:SYS36867,LO,I

68  680 P=87:IF PEEK(900)=255
    THEN P=81
17  690 POKEL1+I*2,P:NEXT
52  730 RETURN
B8  740 PRINT"[HOME,DOWN10]":PRI
    NTBL$:PRINTBL$
8C  750 B1=0:FORI=0TO7
AD  760 PV=PEEK(L1+I*2)
D6  770 B1=B1+ABS(PV=81)*2^I
8D  780 NEXT
34  790 B2=0:FORI=0TO1
A3  800 PV=PEEK(L1+16+I*2)
EC  810 B2=B2+ABS(PV=81)*2^I
B5  820 NEXT
DF  830 POKE(37632+LO),B1:POKE(3
    7888+LO),B2
A5  840 SYSSA,LO,0,0,10
DB  850 RETURN
```

```
3E  1000 PRINT"[CLR,DOWN5]"
53  1010 PRINTTAB(10)"[WHITE]1.
    SET UP EXITS"
A3  1020 PRINTTAB(10)"2. SET UP
    DESTINATIONS"
A3  1030 GETI$:IFI$<"1"ORI$>"2"T
    HEN1030
A4  1040 IFI$="1"THEN200
0C  1050 INPUT"[CLR]LOCATION NUM
    BER";LO
F8  1060 PRINT"[DOWN2,WHITE]"
AB  1070 SYSSA,LO,0,0,2
E0  1080 B1=PEEK(37632+LO):B2=PE
    EK(37888+LO)
A3  1090 FORI=0TO7:B(I)=ABS(B1 A
    ND 2^I):NEXT
22  1100 FORI=8TO9:B(I)=ABS(B2 A
    ND 2^(I-8)):NEXT
14  1110 FORI=0TO9:IFB(I)=0THEND
    (I)=0:GOTO1135
E5  1120 PRINTDI$(I);:PRINT" DES
    TINATION (NOW IS" PEEK(38144
    +LO*10+I);
1B  1130 INPUT")";D(I)
F1  1135 NEXT
13  1140 FORI=0TO9:POKE 38144+LO
    *10+I,D(I):NEXT
D4  1150 PRINT"[DOWN,YELLOW,RVSO
    N]←[RVSOFF] TO EXIT[SPC3,RVS
    ON]^[RVSOFF] ANOTHER LOCATIO
    N"
0B  1160 GETI$:IFI$="←"THEN30
BC  1170 IFI$="^"THEN1000
91  1180 GOTO1160
```

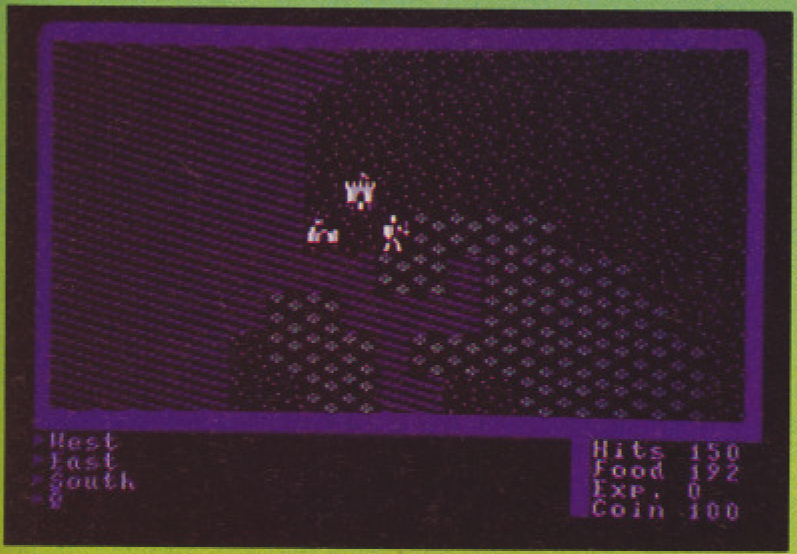
I.Q.

If you hate shooting aliens and feel that you need something more intellectual to stimulate your grey matter then look over this selection of games.

ULTIMA I

Anyone who has ever played the excellent Ultima III or even bigger and better Ultima IV will have wondered how it all started. Playing these games is like watching a film that's already halfway through but now you can find out how it all began in this re-released version of the prequel, Ultima I.

There was once a land called Sosaria that prospered under the rule of Lord British. Unfortunately, there was also an evil Wizard called Mondain who grew in power until he eventually invaded the land with an army of hideous



monsters that quickly crushed all resistance. Sosaria now desperately needs a hero to challenge the Wizard and free the land.

If you haven't already guessed you're the hero and you have to complete this quest on your own. As the game begins you can define your character by assigning an extra 30 points to the existing values (ten) that decide your strength, agility, stamina, charisma, wisdom and intelligence before choosing whether to be a human, elf, dwarf or bobbit and if you're a fighter, thief, wizard or cleric. Once you've decided who and what you are, you head for the great outdoors and a familiar Ultima wilderness screen littered with towns, castles and dungeons. Enter one of these and the screen will change to show the rooms of the building.

Inside towns and castles you can buy food and drink to keep you alive, a room to sleep off injury and exhaustion and shops to buy equipment and weapons to prolong your quest.

As in the subsequent Ultima games you move around, fight and cast spells by pressing single key commands that are detailed on a quick reference guide. This is supplied in the display game box with the disk, booklet of spells and monsters, colour maps of the realm and a small bag of coins.

Ultima I has been rewritten and speeded up for this relaunch and is a must for Ultima adventurers. You may find it a little easy after III and IV but it's still a challenging quest that will lead you to the stars (I'm not saying anymore, you'll have to find out the rest yourself). Coming soon Ultima II and then V! **T.H.**

Touchline:

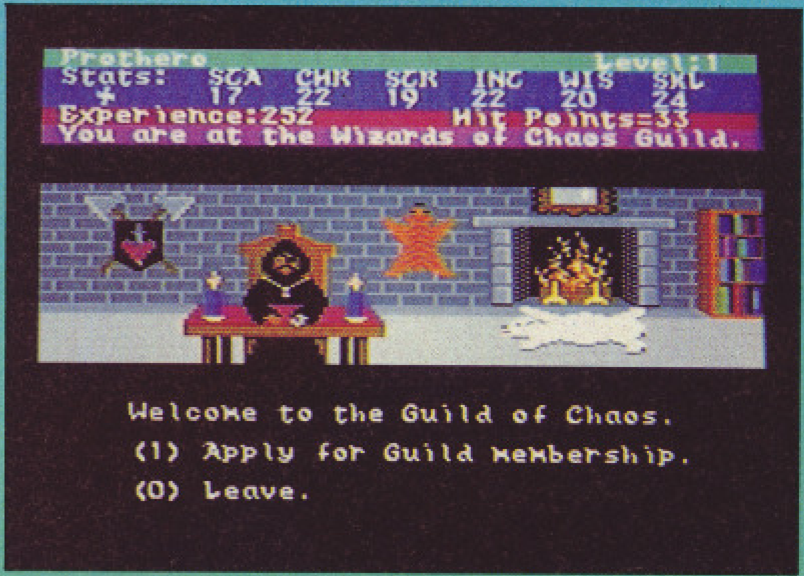
***Title:** Ultima I. **Supplier:** Origin (Micropose) 2 Market Place, Tetbury, Gloucestershire GL8 8DA. **Tel:** 0666 54326. **Machine:** C64. **Price:** £19.95 (disk only). **Originality:** 7/10. **Playability:** 7/10. **Graphics:** 4/10. **Value:** 7/10. **Graphics:** 4/10. **Value:** 7/10.*

ALTERNATIVE REALITY

Imagine all your worst nightmares joined together, and there is a fair chance that most of them will materialise in the Dungeon. Hidden somewhere beneath the City of Xebec's Demise you find yourself in the middle of a bitter conflict with evil proliferating around you. Can you survive long enough to discover how you can turn this discord to your advantage?

The Dungeon is the second scenario in Datasoft's Alternate Reality series. It follows on from the City but you do not need to own this game in order to play. The story is that you have been kidnapped by an alien spacecraft. You find yourself in a room with only one exit which leads into an alternate reality.

As you leave the room, a panel of quickly rotating numbers freeze and your character statistics are generated.



These are strength, intelligence, wisdom, stamina, charm, skill, wealth and hit points. A high figure for hit points – the amount of damage that your body can sustain is recommended. You will not have time to judge any of the other statistics. There are several other characteristics being monitored that you are not told about but must discover as you go. Moral alignment and weapon proficiency would seem to be included.

As you start out, you find yourself by a shop and should take the opportunity to equip your character as best as your few silver pieces will allow with weapons, provisions and clothes. You can haggle for better prices but don't make too low an offer or you will be thrown out on your ear. A club is a useful first weapon.

As you wander down the corridors and explore rooms, it will not be long before you encounter someone or something. What happens next depends on who surprised who. You can try to transact with the creature, attack it or run away. Each of these options leads into a further menu of choices. For example, if you choose transact, then you can offer something such as treasure, talk your way out of a fight, trick your opponent or just try to engage him in normal conversation.

The 'typical encounters' range include paupers, healers, thieves, mages, trolls and goblins (who are at war), the undead, dragons and devils. Remember that if you make a friend somewhere, the chances are that you have made an enemy somewhere else.

Doors lead off in all directions. Most open easily but some require brute strength, a key or the ability to break an enchantment before they yield. Just because you can't see them doesn't mean that they are not there. There are hundreds of secret doors and you will just have to keep walking into walls in order to find out where they are. Or you could use magic.

Magic comes in many guises. If you join a guild (if you can find one in the first place) you can learn the art of spell casting, for a hefty fee of course. Treasure gleaned from vanquished opponents often contains magical items. Potions, wands, tomes, scrolls, trump cards, magic eyes and horns all feature prominently.

Of course, not all treasure is good treasure. Quite a bit of it is cursed, and in which case you will need to repair your guild in order to have the curse removed. Other occupational hazards include catching diseases, being poisoned, getting hungry, thirsty or tired or suffering from extremes of temperature.

Although survival is your initial aim, as you progress, you find that there are various quests that you can undertake. A prisoner wants rescuing, a golden apple needs delivering and you need to find two halves of a ring, forge them together and then destroy the ring in the fires of the oracle.

The dungeon is displayed in 3-D with large illustrations representing special areas such as shops, guilds, the oracle and so on. In size, the Dungeon is a third bigger than the City. Spread over four levels, level one is on a 64x64 grid with successive levels each being a quarter of the size of the one above. This means that accurate mapping is essential. A starter map is included and it is suggested that you photocopy this. Certainly, you will make many mistakes. I found whole areas that I just could not match up and it was not a case of being only one square out either. Teleports, one way doors and mazes only add to your problems.

The game is immensely playable, although expect to kill off a few characters until you get your bearings. One of the complaints levelled against the city was that disk management was very poor and this is something that has now been sorted out. My one grumble is that the save routine is a little clumsy. After saving, it would be nice to be able to resume straight away rather than having to reload the character, but I can live with that.

The description above has only touched on a few of the features of the game. The Dungeon oozes atmosphere and as such, must be one of the best role-playing games on the market today. If the next five modules in the series are anywhere near as good, then fans of this type of game have a treat in store. **G.R.H.**

Touchline:

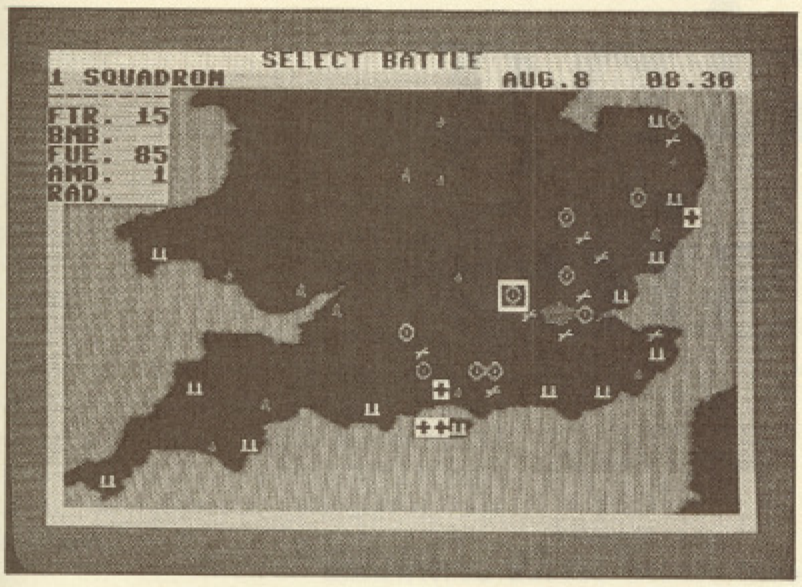
Title: *Alternate Reality – The Dungeon.*
Supplier: *Datasoft/US Gold, Unit 2/3 Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021-356 3388.*
Machine: *C64 – disk only.* ***Price:*** *£19.95.*
Originality: *9/10.* ***Graphics:*** *7/10.* ***Playability:*** *10/10.*
Value: *9/10.*

CONFLICTS 1

There's a treat in store for wargame fans with the release of three of PSS's best known games on one compilation tape. The games are about as different in subject matter as it is possible to get – an air battle, an assault on an island and the defence of an entire continent.

Battle of Britain takes you back to 1940 as you try to pit the limited resources of the RAF against the might of the Hitler's Luftwaffe. The game can be played on three levels ranging from a training game to a fully blown thirty day campaign.

The display is a map of southern England and you are responsible for scrambling squadrons of Spitfires and Hurricanes to counteract the threats of the German fighters and bombers. Not every squadron is available to you as weather conditions play an important part of the game – airfields may be fogbound. The problem is to get a squadron into the air, put it on a course where you think it will intercept the enemy and then after it has attacked, direct it to



land so that it can refuel and rearm. That is simple enough for one squadron but becomes a nightmare when you have eighteen to control, all in real time. There is an optional arcade sequence in which you sit in a Spitfire cockpit trying to shoot marauding Messerschmidts.

Theatre Europe was the game that brought fame and notoriety to PSS. Set in the near future, it simulates an attack by the Eastern block against the combined forces of Nato. The controversy was caused by the fact that you have a nuclear strike capability, either limited or full scale. There were howls of protest from the anti-nuclear brigade and the people who thought that all wargames encouraged bellicosity and ought to be banned. As is usual in these cases, everyone missed the point entirely.

Whichever side you play, it soon becomes apparent that using the nuclear option is a losing one, in so much that both sides escalate everything it becomes goodbye world as we know it. That said, there is still enough in this game to keep you thinking. You must keep your troops supplied, use your airborne forces to their best advantage and decide whether to use chemical weapons. All this on top of fighting a ground battle on a massive scale. There are seven different air missions that you can fly ranging from reconnaissance to attacking enemy supply units.

Falklands 82 has five different levels of play. You must decide where on the island you are going to land your forces and then you only have a limited amount of time in which to clear the island of Argentinian forces. Wise use of your SAS and SBS forces for reconnoitring purposes should help you here.

Each unit has attack and defence factors, a movement allowance and attacking range. For example, a battery cannot move very far each turn but can attack from long range, whereas the Paras have to be next to their opponents before committing themselves to battle. After an attack, you may well, depending on conditions, be able to summon up an airstrike or request naval gunfire to help you. Time is limited, especially on the harder levels and the task of liberating all the settlements is no easy one, especially as you don't know the disposal of the enemy forces.

All three games are very well presented and easy to control, being by and large menu driven. Whereas they lack the complexity of some fully blown wargames, they more than make up for it by being very easy to get into and retaining a high degree of playability. As such, they are highly recommended to beginners and newcomers of this fascinating art. G.R.H.

Touchline:
Title: *Conflicts.* ***Supplier:*** *PSS.* ***Tel: 0203 667556. Machine:*** *C64.* ***Price:*** *£12.95 (ca), £17.95 (d).*
Originality: *8/10.* ***Playability:*** *8/10.* ***Graphics:*** *7/10.* ***Value:*** *8/10.*

STATIONFALL

Your career still hasn't developed the way that you envisaged when you joined the Stellar Patrol some five years ago. You started off as Ensign seventh class, sweeping the decks of space ships. Then, by some quirk of fate, and more than a little skill on your part, you manage to save a planet. Promotion came fast. You are now a lieutenant first-class but still the excitement promised in the glossy brochures when you joined the patrol is nowhere to be found.

Look at your present asignment. Hop over to some remote space station and pick up a supply of Request for Stellar Patrol Issue Regulation Black Form Binders Request Forms. Hardly the stuff of which legends are made, is it? Your eyes light up a bit when you go to pick up your robot, as one of your three available choices is Floyd who assisted you so ably when you rescued Resida (as detailed in Planetfall). He is delighted to see you again and begs to be picked. How could you refuse such an offer?

Completing the paperwork as quickly as possible (in triplicate of course) you set the autopilot in your spacetruck and sit back until you arrive at the space station. You are a trifle surprised to find that there is no-one there to greet you. As you explore, you quickly discover that the entire station is deserted. Even Plato, another robot that Floyd makes friends with is surprised to see you but isn't too sure why.

Wandering around the station, the only clue that you find is in a tape of the Captain's log which has entries about the arrival of a strange alien spaceship which seemed to coincide with a progressive series of malfunctions in every piece of technical equipment. Your worst fears are confirmed when you are attacked by a homicidal hull repair droid.

As is usual with Infocom games, the story is lovingly crafted. It is impossible not to fall for Floyd, nuisance that he is as he creeps up noisily behind you to shout 'boo' lovingly in your ear. The descriptions of locations and objects are wonderful and no-one has mastered the art of guessing the players' 'incorrect inputs' and answering them back in a similar vein – quite like Infocom.

Their parser though, once the wonder of adventurers everywhere is beginning to look somewhat frayed round the edges, especially when compared to the likes of Magnetic Scrolls. For example, a phrase like 'get the tape and examine it', won't work as the parser assumes that you are trying to get something called an 'examine'.

I can't see any adventurer being disappointed, especially if they enjoyed Planetfall. The packaging, which includes a sew-on patch, a set of blue prints and your mission's instruction dockets, just helps to create the atmosphere of yet another excellent Infocom adventure. G.R.H.

Touchline:
Title: *Stationfall.* ***Supplier:*** *Infocom (Activision).* ***Tel:*** *01-431 1101.* ***Machine:*** *C64* –disk only. ***Price:*** *£24.99.*
Originality: *8/10.*
Graphics: *N/A.* ***Playability:*** *9/10.* ***Value:*** *8/10.* YC

Making Music

The second installment of our music series continues coverage of the 64's sound chip, SID, and explains how to play tunes on your Commodore.

By Peter Gerrard

You will find in your Commodore 64 manual a list of high and low value frequencies for a number of notes. They're on page 161, if you've lost them! Here we are concerned with locations (V+0) and (V+1), which will contain the low and high order value frequency respectively.

Say we want to play the note C-3. A glance at the table reveals that the high value frequency is an 8, and the low value frequency is a 97. So, in order to play that note the final line of our program becomes:
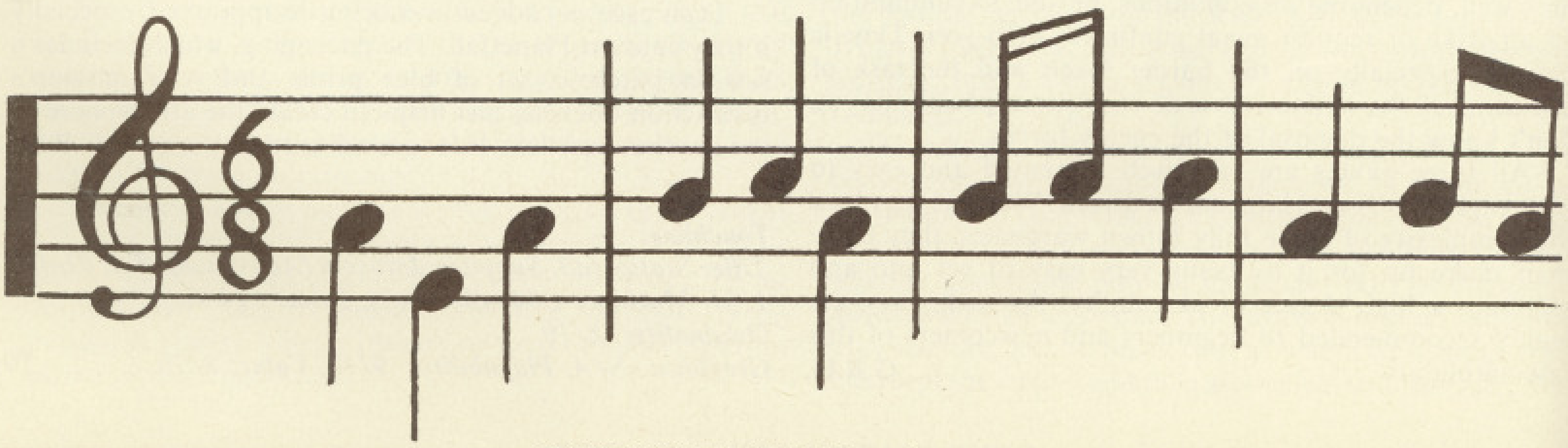
```
30 POKE V+0,97:POKE V+1,8
```

Obviously, the V+0 could be abbreviated to just V if you wanted. To play any other note, just alter the low and high value frequencies in line 30 (values between 0 and 255). To alter the waveform, alter the number in line 25 (remembering to alter the pulse width as well if you select a pulse waveform), choosing between 17, 33, 65 and 129. To alter the ADSR settings, fiddle with the values in line 20 (values between 0 and 255), and to alter the volume just change the value in line 15 (values between 0 and 15 only, please, for now).

When you're satisfied with creating a few simple noises or notes, we'll travel onwards and take a look at producing some harmonies, using all three voices.

In Harmony

Producing notes with all three voices is not that much more difficult than producing notes with one. Having gone through the effort in the last section of setting up a simple note, let us now take a look at some simple ground rules when operating with all three voices.



Volume

This, unfortunately, has to be the same for all three voices, and if the control register is set at 15 then all three will be pumping out their notes at maximum volume. However, by using different waveforms and playing notes from different octaves, one can create the effect of different volumes for the different voices. A low note played using a triangle waveform will sound much quieter than a high note played using a sawtooth waveform, for example.

ADSR

These can be different for the three voices, and it is usually a good idea to make use of this fact when playing notes in harmony. Harmonic effects are probably heard to their best effect when notes are sustained for a reasonable length of time, rather as one would expect on an organ, and so in our program to follow we'll be doing precisely that. Attack and decay rates, however, are probably best left up to the requirements of the individual voices.

Remembering that musical notation refers to notes as C, D, E, F, G, A, B and then back to C again, one octave further up, of course!

To produce a simple chord of C then, we'll take the following high and low value frequencies:

Note	Low Value	High Value	Frequency
C	24	2	536
E	163	2	675
G	35	3	803

From that you can probably work out the relationship between frequency and high and low values. Multiply the high value by 256 (now *there's* an unfamiliar number!) and add the result to the low value. This gives us the frequency value. So why are frequency values easier to work with? Well, if we wanted to play our chord in a higher octave, say the next octave up the scale, we would multiply the frequencies by 2: this is the relationship between notes in different octaves. To go up another octave then, we'd multiply the frequency by 2 again. It's a lot easier multiplying one number by 2 than it is multiplying two numbers and trying to extrapolate a result from that!

So, having got the values, let's take a look at our program, bearing in mind that we're going to be using all three voices, and that the control registers that look after each voice come in blocks of seven. That is, if we use our variable V=54272, we'll see that the waveform for voice one is controlled by register (V+4), for voice two by (V+4+7 or V+11).

Waveforms

Once more we can make use of the facilities available with the SID chip and use different waveforms for each of the voices. However, the white noise waveform is not going to be an awful lot of use if we're going to be attempting to produce intricate, pleasant sounding harmonies, so for the purpose of this exercise we'll stick to just triangle, sawtooth or pulse.

Note Values

Fortunately all of these are worked out for you in the Commodore 64 manual, and as well as giving you the high value and low value frequencies for each note over some seven octaves, they also give you the value of the note in cycles per second. This is related to the frequency values in quite a simple fashion, but it can be of more use to us, especially when lengthy tunes or more advanced programming methods are encountered.

When playing in harmony, it is probably best to stick to some straightforward rules. One doesn't have to be a Mozart to realise that C and C Sharp when played in conjunction with D are not going to sound very harmonious. Consequently, in these early experiments we'll stick with playing some very simple chords. Simple, but they do produce a very pleasing result. We'll start with a very straightforward chord, played in the key of C, and using the notes of C, E and G for our three voices, and for voice three by (V+4+7+7 or V+18). This enables us to set up a simple FOR ... NEXT loop to look after all three voices.

The Program

As before, we'll flush out the entire SID chip contents first before we start by setting the variable V and turning the volume on.

```
5 FOR I=0 TO 24:POKE 54272+I,0:
NEXT
10 V=54272
15 POKE V+24,15
```

So far so good, and exactly the same as before. Now let's set the ADSR sequences up for the three voices.

```
20 POKE V+5,9:POKE V+6,240
21 POKE V+12,9:POKE V+13,240
22 POKE V+19,33:POKE V+20,36
```

There is no great significance to any of those values, other than that we have used quite a long sustain and release for each one. Now to set the waveforms.

```
25 FOR I=0 TO 2:POKE V+I*7+
0:NEXT I
26 POKE V+4,17:POKE V+11
33:POKE V+18, 65
27 POKE V+16,0:POKE V+17,255
```

The only difference now is that we're using different waveforms for all three, and that voice three is using the pulse waveform. Finally, we need to play the actual notes, like this:

```
30 POKE V+0,24:POKE V+1,2
31 POKE V+7,163:POKE V+8,2
32 POKE V+14,35:POKE V+15,3
```

The result is hopefully a pleasant sounding chord.

From here it is but a simple matter to play different chords in different keys. All you'll need to do is to look up the high and low values frequencies in the manual, and remember that chords tend to go in jumps of two notes at a time. That is, something like C, E, G as we've played here, or D, F, A for a chord of D, or G, B, D for a chord in G, and so on. You are welcome, of course, to experiment with discordant

chords, if you can have such a thing, but remember that you might get on very well with your neighbours at the moment and that I won't be responsible for any untoward results.

Bearing in mind the techniques used here (and in particular the use of a FOR ... NEXT loop and the relationship between the three voices) it is but a simple step to go from notes and chords to proper tunes. There are many ways of extracting a tune from your Commodore 64, and in the next installment we'll take a look at some of the easiest methods.

Playing Tunes

Using the material that we've covered so far, there is really only one thing further that you need to know in order to be able to play some tunes on your Commodore 64 — the notes we're going to play.

Later on we'll be using a modified synthesiser program to do all this for us, but for now we'll stick to some very simple things that most people will either know before typing in or recognise when played. Having got as far as using three voices we will continue to use them, and we may as well stick to the waveforms and ADSR envelope shapes that we've already set up. So, our program begins like this:

```
5 FOR I=0 TO 24:POKE 54272+I,0:
NEXT
10 V=54272
15 POKE V+24,15
20 POKE V+5,9:POKE V+6,240
21 POKE V+12,9:POKE V+13,240
22 POKE V+19,33:POKE V+20,36
25 FOR I=0 TO 2:POKE V+I*7+4,0
:NEXT I
26 POKE V+4,17:POKE V+11, 33:
POKE V+18,65
27POKE V+16,0 :POKE V+17,255
```

So far so good and so far, familiar. We won't yet carry on to include the three lines from the last section that actually played a chord, we'll consider what notes we are going to play first of all.

A familiar enough tune to everybody must be the 'theme' used in Close Encounters of the Third Kind when the aliens and humans finally establish some sort of communication and produce a welter of sound and lighting effects that would do justice to an Electric Light Orchestra concert. The five all-important notes are D, E, C from one octave, and from an octave further down we have C and G. The five notes are played in that order, and since they also have more or less the same duration, we can concentrate on the notes for now and worry about the duration afterwards.

It really is about time to forget about high value and low value frequencies, and to turn permanently to true frequency values, or the number of cycles per second for each particular note. For the five notes in our Close Encounters theme, the frequency values are as follows:

```
100 DATA 1204,1351, 1432, 536,
803
101 DATA -1
```

The -1 data element in line 101 will serve to tell the program that we've run out of data and are not going to be playing any more notes. If we add the following lines to our main program, we'll be able to produce a simple tune:

```
30 READ F:IF F=-1 THEN FOR
I=0 TO 24:POKE V+I,0:NEXT
I:END
31 FH=INT(F/256):FL=F-FH*256
32 FOR I=0 TO 2
33 POKE V+I*7,FL:POKE
V+I*7+1,FH
34 NEXT I
40 GOTO 25
```

This, as you will soon realise, does not produce a very sensible tune, and we do need to introduce some form of delay before going back to line 25 and getting the next note. a line something like line 35 would suffice for now:

```
35 FOR I+0 TO 1000:NEXT I
```

A one second delay occurs between notes. But wouldn't it be better if we were to let the program produce the delay for us, rather than just having a one second delay all the time? Here's just one way of doing that:

```
100 DATA
1204,50,1351,50,1432,50,536,50,
803,100
```

and amending line 35 to read:

```
35 READ DE:FOR I=1 TO
DE*20:NEXT I
```

This gives us much more control over the duration of each of the notes, but is still a long way from being really satisfactory. We can only achieve this through much trial and error, or removing the programming side of things altogether and letting the person running the program do the job. If we had our original line 100 back again which is :

```
100 DATA 1204,1351 1432, 536, 803
```

we could insert yet another new line 35 to read:

```
35 GET A$:IF A$ < >" " THEN
35
```

In which case we would wait for the person running the program to press the space bar before proceeding on to play the next note. However, this is still using alot of the 64's musical capabilities, and in order to make each voice play the note in a different key, we would have to make something like this:

```
31 FH=INT(F/256):FL=F-FH*256
32 FOR I=0 TO 2
33 POKE V+I*7,FL:POKE
V+I*7+1,FH
34 NEXT I
```

into:

```
31 FOR I=0 TO
2:F=F*2↑ I:FH=INT(F/256):FL=F-
FH*256
32 REMark is now redundant
33 POKE V+I*7,FL:POKE
V+I*7+1,FH
34 NEXT I
```

Each voice now plays its note in a successively higher octave, the new frequency value being determined by the statement F=F*2 ↑ I in line 31, since this will give us the value F on the first pass through the loop when I is equal to zero, F*2 when I is equal to one, and finally F*4 when I is equal to two. Raising two to the power of I is a useful shortstep to producing the desired frequency.

But all this is concerned with producing simple notes, albeit in different octaves. How might we go about producing a three-part harmony, still using our Close Encounters data and no more? For this we have to try and understand the relationship between individual notes, since we do not want to spend the rest of our days working out vast numbers of different frequency values.

Note to Note

We've already noticed that octaves are separated by a frequency value of two. That is, C in one octave has half the frequency of C in the next octave, a quarter that of C in the next octave again, and so on. Unfortunately for us there isn't a convenient number of notes from one C to the next, since there is only a gap of six notes between Cs, or seven notes (including the C itself) in total.

A simple, but not entirely satisfactory solution, would be to divide the difference between two octaves into sevenths, and use these values for our chords of D, E, C, C again and G for the Close Encounter theme. Alas (as you'll discover if you try it out) this does not work out exactly. Those little black notes have a habit of getting in the way.

Fortunately there is a mathematical expression for getting the frequency of the next note up the scale, provided you know the frequency of the proceeding note, and it works like this. Assume that F is the frequency of the note, not yet converted into high and low values to be POKEd into memory. Then, if we assign this to, say, C, then the frequency of the note D in the same octave is found by the expression:

```
FN=INT(F*2 ↑ (1/6))
```

A mite complicated, but it does work! For example, the frequency of a particular C in a particular octave is given as 1072 cycles per second. Applying this to our formular above gives us the new frequency of 1203. Not exactly the value given in the manual (which is 1204) but close enough, and those in the manual are never meant to be taken as gospel anyway.

So once more unto the breach, and instead of spreading our three voices over different octaves, we'll now get them playing in harmony by introducing the following changes to the program:

```
31 FOR I=0 TO 2:IF I=0 THEN
FH=INT(F/256):FL=F-
FH*256:GOTO33
32 F=INT(F*2 ↑ (2/(12/(I*2+1))))
33 POKE V+I*7,FL:POKE
V+I*7+1,FH
34 NEXT I
```

Now doesn't that look wonderfully complicated? It's quite simple, really, don't panic! On the first pass through the loop nothing untoward happens, because we just want the orignal value of the frequency. Second time around, remembering that a chord of D will consist of the notes D, F, A, we want to be two notes higher up. In other words, replace the original (1/6) by (1/3), which, believe it or not, is what all the rigmarole above does. On the final pass through the loop we want the frequency of the note that is four notes up from our original D, but since we cannot have (1/6) replaced by (1/1.5) we have to do everything in fractions of 12.

The main thing is that it works. Also a few of the variations on a theme that can be achieved by using just five data times. By playing in different octaves, or by producing chords, we begin to get some idea of the power behind the 64. But this isn't of course, the only method of playing tunes on the machine, and so for the rest of this particular section we'll be taking a look at one or two other examples of tune playing. After that, well, the light relief is over and we turn to theory in our attempts to get the most out of the SID chip.

Tuning up

Here's the first of just two different methods of playing simple tunes on the 64 from data statements, without any guidance at all, because you should be getting familiar with the registers and their locations and functions by now. Play with them, embellish them, because it is only by doing that that you'll really begin to understand the workings of SID.

```
10 V=54272
20 POKE V+24,15
30 POKE V+5,9
40 POKE V+6,0
50 POKE V+2,255
60 POKE V+3,20
70 POKE V+4,65
80 READ A,B,C
90 IF A<1 THEN 200
100 POKE V+1,B
110 POKE V,C
120 FOR I=1 TO A*50:NEXT I
130 FOR I=0 TO 23:POKE
V+I,0:NEXT
140 GOTO 20
150 DATA
5,22,227,5,22,227,5,25,177,10,21,154
152 DATA 2,22,227,7,25,177
154 DATA
5,28,214,5,28,214,5,30,141,10,28,214
156 DATA 2,25,177,7,22,227
158 DATA
5,25,177,5,22,227,5,21,154,10,22,
227,0,0,0
200 FOR I=0 TO 24:POKE
V+I,0:NEXT:END
```

One way of doing things: you may (I hope) spot the 'tune' being played, which makes me sound like Lionel Blair I suppose, but that's the only similarity between us, I assure you!

For our final example, here's a slightly different way of achieving the odd sound effect or two:

```
10 V=54272
20 POKE V+24,15
30 POKE V+5,9:POKE
V+12,36:POKE V+19,255
40 POKE V+6,0:POKE
V+13,36:POKE V+20,70
45 POKE V+3,A:POKE V+10,15
46 POKE V+2,20:POKE V+9,20
50 POKE V+4,65:POKE
V+11,129:POKE V+18,129
60 FOR I=0 TO 40:POKE
V+1,I:POKE V+7,4:POKE
V+15,3:NEXT I
70 A=A+10:IF A>250 THEN A=0
80 FOR I=0 TO 23:POKE
V+I,0:NEXT I
90 GOTO 30
95 FOR I=0 TO 24:POKE
54272+I,0:NEXT
```

Press the RUN/STOP key to get out of this one, and then enter GOTO 95 to shut everything up.

There are many weird and wonderful sound effects that can be achieved by 'mucking' about with just the things that we've learnt about so far. Try altering the various parameters in this, and other programmes, to see what the effect might be.

When we start considering the more advanced techniques available to us on the 64, such as filtering, ring modulation, synchronisation, not only will we be able to start producing ever-more wonderful effects, but we will also be on the path to producing a true synthesiser, involving the simulation of different musical instruments, and much more besides. However, before we can talk about musical impersonation we need to know a great deal more about how various work, and in particular how different instruments produce the sound that they do.

Consequently, in the next section, we'll be looking in some detail at ADSR envelopes, and how changing them can produce a wide variety of different and unusual sounds and how, combined with a selection of different waveforms and one or two other parameters, we can really start to realise the potential of the 64 and its SID chip.

Attack Decay Sustain Release

In order to enhance the quality of any musical performances that we might achieve by using the Commodore 64, a thorough understanding of the envelope shape of a voice, or the ADSR setting is essential. The simple definitions that we have already given for the phrases Attack, Decay, Sustain and Release will tell us what they mean, but will not explain precisely how they operate. Consider the following program:

```
10 V=54272
20 POKE V+24,15
30 POKE V+4,0:POKE V+4,33
40 POKE V+5,9:POKE V+6,0
50 POKE V+1,10:POKE V,10
```

This produces a note of a certain frequency playing using the sawtooth waveform, and having an Attack/Decay setting of nine combined with a Sustain/Release setting of zero. The note, as you will hear, soon dies away to nothing. However, if we alter line 40 to read:

```
40 POKE V+5,33:POKE V+6,49
```

Now the note does not immediately die away, and indeed sounds rather different. A more substantial program should illustrate how the various settings of ADSR can be combined to produce some very different effects. Later on, we shall be looking at the workings of the two registers that control the entire envelope shape of the note (for voice one only, they work in exactly the same way for voices two and three).

```
10 V=54272
15 FOR I=0 TO 24:POKE
V+I,0:NEXT I
20 POKE V+24,15
25 A=1:D=1:S=1:R=1:W:=1
30 PRINT"[CLR]"
35 PRINT"[HOME]Attack Decay
Sustain Release W/Form"
40PRINTTAB(4)ATAB(11)DTAB
(19)STAB(28)RTAB(37)W*16(+I
45 POKE 198,0
50 GETA$:IFA$=""THEN50
55IFA$="A"THENA=A+1:IFA=17
THENA=0
60IFA$="D"THEND=D+1:IFD=17
THEND=0
65IFA$="S"THENS=S+1:IFS=17
THENS=0
70IFA$="R"THENR=R+1:IFR=17
THENR=0
75IFA$="W"THENW=W*:IFW=16
THENW=1
80 POKE V+5,A*16+D:POKE
V+6,S*16+R
85 POKE V+4,0:POKE
V+4,W*16+1:POKE V+2,40:POKE
V+3,40
90 POKE V+1,20:POKE V+0,20
95 GOTO 35
```

A fairly straightforward program, but it illustrates the point. After setting up the variable V the program then displays the current settings of Attack, Decay, Sustain and Release on the screen before waiting for the user to press a key. Pressing the 'A' key increases the attack setting, D the decay setting, S the sustain setting and R the release setting. Finally, pressing W changes the waveform, should you choose to do so.

The ADSR settings are POKEd into place in line 80, before line 85 takes care of the waveform (and sets a low pulse frequency and a high pulse frequency, if required), before the note itself is at last played by line 90.

You might care to add to the program, so that different pulse frequencies can be selected, or different notes played. The changes are not too difficult, and since we've taken the precaution of having our line numbers increase in steps of five there's plenty of room for additonal statements to be inserted if required. These will probably be along the lines of IF A$="something or other" THEN increase some variable. Not perhaps, the most elegant way of programming, but it will suffice for this simple example.

Now for a few words of explanation. You'll see that the waveforms are set to values of 1, 2, 4 or 8. By multiplying this by 16 and adding 1 we arrive at our more familiar values of 17, 33, 65 and 129.

You will note that the various ADSR settings never progress beyond 16. This is because the two control registers that look after these settings are obviously, dual purpose ones, and operate in this fashion.

A	A	A	A	D	D	D	D
S	S	S	S	R	R	R	R
128	064	032	016	008	004	002	001
008	004	002	001	008	004	002	001

In each case, the first four bits of each byte are used to control one setting, the second four looking after the other settings. To take the Attack/Decay register for now, since the Sustain/Release one works in exactly the same way, we will see that the maximum value of the Decay setting is actually 15, coming from the addition of (8+4+2+1). Sixteen possible settings then, force 0 through to 15.

It might appear that the value of the Attack can vary from 0 to (128+64+32+16) or 240, covering such values as 48, 160, etc., on the way. However, adding all those combinations up gives us, yes, fifteen different settings, or sixteen if you include zero option. How much easier it is to think of settings ranging from 0 to 15 again (rather than 0 to 240 and obscure points inbetween) and then mutliply the end result by 16 to arrive at the higher value. If you check all the

possibilities through, you'll soon see that this much neater system works very well.

It is important to understand this principle, because we will be using it again when we come to some of the other multi-purpose (not just dual, either!) registers in the sections on ring modulation, synchronisation and filtering.

Just think in terms of bits and bytes and our earlier discussion about how a byte is made up on an 8-bit computer.

Having heard what the ADSR settings do, you might be wondering how to go about converting these settings into passable impersonations of musical instruments. Well, the Commodore 64 manual gives us some hints such as:

Instrument Impersonation

Instrument	Waveform	Attack/Decay	Sustain/Release	Pulse Rate
Piano	Pulse	9	0	Hi+0, Lo+255
Harpsichord	Sawtooth	9	0	-
Accordian	Triangle	102	0	-

Do these sound like the real thing, if you use the values in our little program given earlier? About as much as I sound like Frank Sinatra, which is not alot, believe me. No, there is a lot more to impersonating musical instruments than just fiddling about with ADSR settings, although they are obviously important.

As a starting point, though, they will have to suffice, and although we'll be taking a few more steps in the next couple of sections, try for now to think about the sound produced by the instruments mentioned above. A piano, for instance, produces a very sharp note, which is sustained for a while, and then usually decays away quite slowly. How would you go about setting up the ADSR envelope for something like that?

Well, in all these cases it is alot easier to visualise something than it is to try and describe it, so the following program should be of some help when it comes to thinking up suitable ADSR settings.

YC

PROGRAM: ADSR SETTINGS

```
E8  5 POKE53280,9:POKE53281,7:PR
    INT"[CLR]"CHR$(14)"[BLACK,SA
    ,SD,SS,SR] [SS]ETTINGS ..."
C6  6 PRINT:PRINT"[SW]HEN REQUES
    TED, ENTER THE [SA]/[SD]/[SS
    ]/[SR]
AD  7 PRINT"SETTINGS FOR YOUR NO
    TE, FOLLOWED BY THE
47  8 PRINT"WAVEFORM, AND THEN T
    HE FREQUENCY OF THE
05  9 PRINT"NOTE ITSELF.":GOTO10
    0
AC  10 POKE53272,PEEK(53272)OR8
05  12 POKE 53265,PEEK(53265)OR3
    2
3D  13 GOTO16:REM YES I KNOW IT'
    S THE MOST UNSTRUCTURED PROG
    RAM IN THE WORLD!
16  14 FORI=8192TO16191:POKEI,0:
    NEXT:RETURN
61  16 PRINT"[CLR]";
FC  20 FORI=8192TO12191:POKEI,0:
    NEXT
E0  55 Y=20:X=40:
62  60 R=INT(Y/8):C=INT(X/8)
A2  65 L=YAND7
03  70 B=7-(XAND7)
D5  75 BYTE=8192+(R*320)+(C*8)+L

59  80 POKEBYTE,PEEK(BYTE)OR(2^B
    )
A9  81 Y=Y+1:IFY<85THEN60
25  82 Y=Y-1:X=X+1:IFX<261THEN60

9C  83 X=40:Y=84:X1=X+A*4:Y1=20:
    RATIO=64/(X1-X+1):GOSUB300
64  84 X=X1:Y=Y1:X1=X1+D*4:Y1=52
    :RATIO=-(32/(X1-X+1)):GOSUB3
    00
0A  85 X=X1:Y=Y1:X1=X1+S*4:Y1=52
    :RATIO=1:GOSUB350
BC  86 X=X1:Y=Y1:X1=X1+RE*4:Y1=8
    4:RATIO=-(32/(X1-X+1)):GOSUB
    300
BC  90 GETA$:IFA$=""THEN90
7A  92 IFA$="←"THENPOKE53265,27:
    POKE 53272,21:RETURN
20  94 GOTO90
E6  100 PRINTCHR$(14):PRINT"[SN]
    OW JUST HANG ON A WHILE ..."

2D  101 GOSUB14
27  102 PRINT"[CLR,SA]TTACK [SD]
    ECAY [SS]USTAIN [SR]ELEASE [
    SW]AVEFORM"
B6  103 PRINTTAB(1)ATAB(8)DTAB(1
    5)STAB(23)RETAB(31)WF
04  104 PRINT:INPUT"[SA]TTACK  (
    0-15)[SPC6,LEFT6]";A:IFA<0OR
    A>15THENPRINT"[UP2]";:GOTO10
    0
41  105 INPUT"[SD]ECAY[SPC3](0-1
    5)[SPC6,LEFT6]";D:IFD<0ORD>1
    5THENPRINT"[UP]";:GOTO105
18  110 INPUT"[SS]USTAIN (0-15)[
    SPC6,LEFT6]";S:IFS<0ORS>15TH
    ENPRINT"[UP]";:GOTO110
F2  115 INPUT"[SR]ELEASE (0-15)[
    SPC6,LEFT6]";RE:IFRE<0ORRE>1
    5THENPRINT"[UP]";:GOTO115
7A  116 PRINT:PRINT"[SA]NY MORE
    CHANGES ([SY] OR [SN])?"
B8  117 GETA$:IFA$="N"THEN145
5F  118 IFA$="Y"THEN120
55  119 GOTO117
CD  120 PRINT:INPUT"[SW]AVEFORM
    (1, 2, 4 OR 8)[SPC6,LEFT6]";
    WF:IFWF<1ORWF>4THENPRINT"[UP
    2]";:GOTO120
87  122 IFWF=4THENINPUT"[SP]ULSE
     HI (0-255)[SPC6,LEFT6]";PH
DF  124 IFPH<0ORPH>255THENPRINT"
    [UP]";:GOTO122
31  126 IFWF=4THENINPUT"[SP]ULSE
     LO (0-255)[SPC6,LEFT6]";PL
21  128 PRINT:INPUT"[SF]REQUENCY
     (256-16572)[SPC6,LEFT6]";FR

66  130 IFFR<256ORFR>16572THENPR
    INT"[UP]";:GOTO130
2D  135 FH=INT(FR/256):FL=FR-FH*
    256
04  140 W=WF*16+1
15  145 PRINT:PRINT"[SP]RESS [SR
    ,SE,ST,SU,SR,SN] TO QUIT OR
    ANY OTHER KEY TOCARRY ON."
A0  146 GETA$:IFA$=CHR$(13)THENP
    OKEV+24,0:END
C3  147 IFA$=""THEN146
FB  148 V=54272:POKEV+24,15
0D  150 POKEV+5,A*16+D:POKEV+6,S
    *16+R
82  155 POKEV+2,PL:POKEV+3,PH
33  160 POKEV+4,0:POKEV+4,W
2C  165 POKEV+0,FL:POKEV+1,FH
5D  170 PRINT:PRINT"[SP]RESS ANY
     KEY FOR [SA,SD,SS,SR] DIAGR
    AM, AND WHEN
87  175 PRINT"[UP]YOU'VE FINISHE
    D VIEWING THAT, PRESS
D4  180 PRINT"'←' TO RETURN TO S
    ELECTION PROGRAM."
59  181 PRINT:PRINT"[SS]ORRY IT'
    S ALL A BIT SLOW, BUT ME AND
DA  182 PRINT"HIGH-RES MIX LIKE
    OIL AND WATER ... MY  APOLOG
    IES."
E2  185 POKE198,0
52  186 GETA$:IFA$=""THEN186
54  190 GOSUB10
49  200 PRINTCHR$(14);:GOTO102
63  300 V=0:B1=Y:A1=X
CF  301 IFX1=XTHENGOSUB380:RETUR
    N
57  302 A1=X+V:B1=Y-INT(V*RATIO)

5F  303 V=V+1:IFV>(X1-X)THENRETU
    RN
A6  304 RO=INT(B1/8):C=INT(A1/8)

43  305 L=B1AND7
CC  310 B=7-(A1AND7)
47  315 BYTE=8192+(RO*320)+(C*8)
    +L
28  320 POKEBYTE,PEEK(BYTE)OR(2^
    B)
64  325 GOTO302
08  350 FORI=XTOX1STEP2
D0  351 B1=Y1:A1=I
96  352 RO=INT(B1/8):C=INT(A1/8)

9D  355 L=B1AND7
72  360 B=7-(A1AND7)
29  365 BYTE=8192+(RO*320)+(C*8)
    +L
7A  370 POKEBYTE,PEEK(BYTE)OR(2^
    B)
FA  375 NEXT
17  380 FORI=YTOY1STEP2
4C  381 B1=I:A1=X
9C  382 RO=INT(B1/8):C=INT(A1/8)

F9  383 L=B1AND7
FA  384 B=7-(A1AND7)
8D  385 BYTE=8192+(RO*320)+(C*8)
    +L
2A  386 POKEBYTE,PEEK(BYTE)OR(2^
    B)
06  387 NEXT
0B  388 RETURN
```

PLEASE NOTE THE ^ SIGN IS THE UP ARROW KEY (NEXT TO *).

WIN A FREE FLIGHT ON CONCORDE

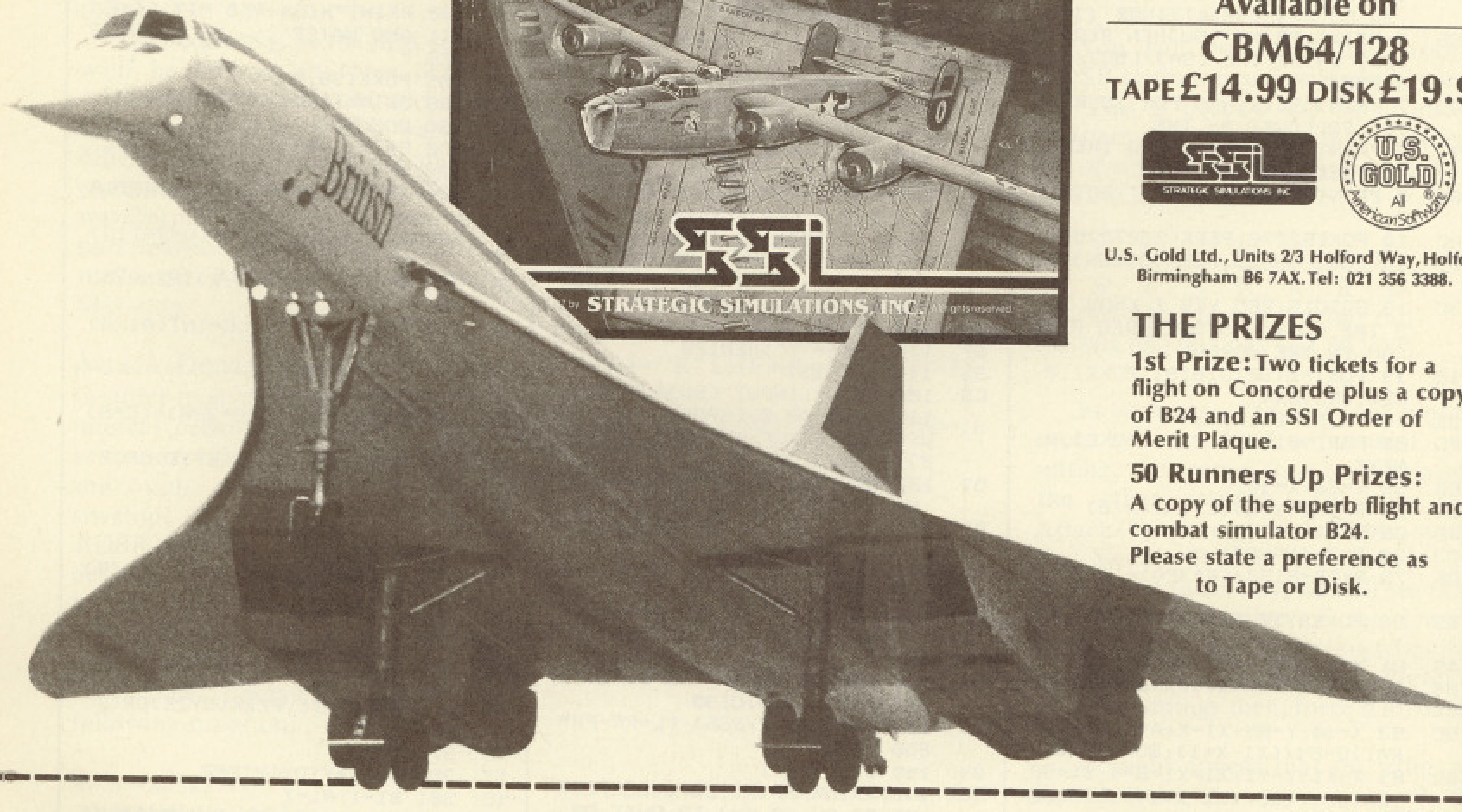
The creators of B24, a superb combat and flight simulator based on one of World War II's most famous aircraft are offering the once in a lifetime opportunity for you to win a free trip on Concorde, the world's most famous airliner.

By answering the simple questions below you could win a dream trip on the world's only supersonic passenger aircraft flying at speeds faster than the bullet from a gun.

CONCORDE... THE FACTS

- Concorde first flew on 2 March, 1969.
- Concorde has carried over 800,000 passengers over 50 million miles.
- Concorde holds the record for the fastest passenger flight London to New York in 2 hours 56 minutes on 1 January, 1983.
- Concorde's maximum level speed is 1,367 mph.
- Concorde carries a maximum of 128 passengers.





If you are not a lucky winner in this great competition, don't worry because you can still experience the thrills of flight plus the exhileration of combat in B24.

B24

From the war torn skies of World War II emerged one legendary offensive weapon – the B24 bomber. This superb simulation allows you to recreate the exploits of this great aeroplane on single mission runs or a 19 mission campaign to destroy oil refineries in Poletsi, Rumania.

As pilot, you control the mission flight on a bombing raid from your home base in Italy; as group leader you command 40 B24's on bomb runs to 14 targets deciding on when and where to bomb depending upon weather, plan availability, group efficiency and target oil production levels. A flight and combat simulation of unparalleled quality.

Available on

CBM64/128

TAPE £14.99 DISK £19.99

U.S. Gold Ltd., Units 2/3 Holford Way, Holford, Birmingham B6 7AX. Tel: 021 356 3388.

THE PRIZES

1st Prize: Two tickets for a flight on Concorde plus a copy of B24 and an SSI Order of Merit Plaque.

50 Runners Up Prizes:
A copy of the superb flight and combat simulator B24.
Please state a preference as to Tape or Disk.

HOW TO ENTER

To win a supersonic flight on Concorde answer the following four questions and then in not more than fifteen words why you want to fly faster than the speed of sound. In the event of a tie, the most original reason will win the first prize.

Please send entries to:–
U.S. Gold Ltd.,
Units 2/3 Holford Way,
Holford, Birmingham B6 7AX.

1. What is the speed of sound (mph)? ....
2. Name three World War II SSI titles. ....
....
3. What do the initials USAAF stand for? ....
....
4. What is Flak? ....
....
5. (In not more than fifteen words) I would like to fly faster than the speed of sound because ....
....
....
....

Name .... Age ....
Address .... DISK ☐ TAPE ☐

RULES

1. This competition is open to all residents of the UK except employees of this magazine and their associate Companies, families and agencies. Employees of U.S. Gold Software, their agencies and families and friends.
2. The prizes stated will be awarded to the entrants who answer the questions correctly and give the most original answer to question 5.
3. Entries altered, illegible or not completed in accordance with the rules of entry requirements will be disqualified.
4. All entries must be on an official entry form.
5. All entries become the property of U.S. Gold Software Ltd., and cannot be returned.
6. It is a condition of entry that the competitors agree to be bound over by the rules.
7. Closing date for receipt of all entries is 31.10 87.
8. All entries to arrive at U.S. Gold Ltd., Units 2/3 Holford Way, Holford, Birmingham B6 7AX before the above date.
9. The winning entrants will obtain:
1st Prize – A flight for two on Concorde, a copy of B24 and an SSI Order of Merit Plaque.
Runner Up Prizes – 50 copies of B24.
No alternative prizes are offered.
10. The judges' decision is final and no correspondence will be entered into.

YS

Link Up

Here is the chance to link up a short-wave technical receiver and Commodore 64 to a Transceive interface and multimode receive program.

By Evelyn Mills

Before going into the feature details of this versatile system, it is helpful to know a few basic facts about the receiver. Firstly, what receiver is required? The market is open here, with models ranging in price from £24 to £600. Regrettably the lower priced models will not function with interfaces/software of this type as certain basic criteria are required.

Your short-wave receiver should cover the range 1.8 - 30 MHz and it must have a detector to receive SSB (single side band) plus a CW filter for picking up morse. To tune to an exact frequency, a receiver with digital display is much more accurate.

Price Range

Having said all this, how much do you have to pay for such a model? Looking around a second-hand market would be informative as there is a constant supply and demand. Our household model is a YAESU FRG7000 which costs around £200, second-hand. (Remember, that short-wave listening is a hobby within itself which users get a great deal of information and pleasure from.)

An acceptable receiver will set you back a minimum of £150 second-hand and should have all the above features including the facilities to use a good aerial and earth; the receiver used here was worked on a long wire antenna (40 metres), suitably grounded to reduce background noise.

Onto Computing

The interface, which is small and compact, plugs into the user port of the C64, and is connected to the audio output on the short wave receiver (cables and connectors are supplied). It has a single switch which controls three functions; one position sets the computer for CW reception, another for RTTY reception and the third for filter on/off. According to the data you wish to receive, set the switch accordingly and load the disk RX-4 program.

While the program is not lengthy, it is extremely compact and efficient in use. All of the commands function via a single key press, a list of which is given in the literature supplied. On loading, a status line is displayed at the bottom of the screen. Press R and this indicates that you are in RTTY (teletype) mode; a C press takes you to morse reception, an A press to AMTOR reception and a T press to download SSTV (slow screen television scans). The AMTOR mode will not be discussed here as it is very similar to RTTY.

Our main options are T,R, and C. Inasmuch as morse transmissions were received and translated with considerable facility, let's get into the C option first.

To do this, set the interface switch to CW then tune into the amateur bands available for morse transmission, using the CW option on your receiver. These bands are listed in most short-wave handbooks and the more successful were found to be the 3.0 - 3.150 MHz and 14.0 - 14.350 MHz bands. The software controlling reception has a filter selection of 700 Hz, 1360 Hz plus a filter OFF mode; these are displayed at the bottom of the screen and are selected with single computer keys. There are also single key controls for setting word speed. For amateur morse, 20 w.p.m. or 40 w.p.m. should be used (depending on the speed of transmission). A speed setting capable of handling up to 250 w.p.m. is also available.

Let us assume that you have tuned into a good, clear morse transmission. At the top left-hand corner of your screen, nothing is visible until tuning is perfect, at which point a flashing yellow cursor will appear and the morse transmission will now be translated to text on your screen (in English or the appropriate language – such conversations are regarded as confidential and may not be printed here). You will find the transmitter's call-sign printed out, eventually enabling you to locate his/her geographical position (with reference to handbook).

It should be remembered that many people use morse in an abbreviated form or even in coded form: furthermore you are just as likely to catch the end of a conversation as the beginning. In fact, what you pick up is a matter of trial, error and chance!! The transmission may be 'locked' on autotrack if need be.

During reception, when one screen is full, it is overwritten by subsequent data which allows fast decoding. All material can be saved to disk by pressing S – a bleep will be heard which should be followed by a single number

or letter for program identification – the saving process then begins.

To output to the Commodore printer or MPS 801 press P either directly from the screen or from saved material. The latter is reloaded with a D press; when followed by O, data will again be visible on screen. Approximately 32K may be stored which is more than adequate for most transmissions. RESTORE will clear the screen but not the memory, so if you have a lot of rubbish coming through initially, due to excessive background noise or inaccurate tuning you will find that this is saved as well within any one program – generally as E's, I's and asterisks. Should you search around bands other than the amateur ones, you will find that information is transmitted in fast code.

The Teletype Selection

Switch the interface to RTTY, filter ON mode and press R for software selection. At the bottom of the screen you will find the RTTY definition plus, at the lower right-hand corner, two cursors for tuning purposes. When a station is located, a vertical black band will oscillate across the cursors to give very fine tuning – you are well on mark when the lines oscillate from left to right at a rapid rate. This will, naturally vary with the intensity of the signal.

Once you are tuned to a station (handbook useful) the teletype message is then printed to screen. Most of the material I picked up was either coded or in German or Swedish. Experience is needed here to know when and where to get the English transmissions (uncoded).

Pressing T will give a full screen picture if any SSTV (slow scan TV) is being transmitted.

To be Recommended

This is a very dedicated hobby which requires a great deal of patience and computer time. Certainly the product marketed by Technical Software will not let you down. Technically everything functions very smoothly and the single key presses, allow for rapid switching from mode to mode. Other key presses exist (F for figures, L for letters, etc.) which are described in detail in the literature supplied; helpful data is also given for the novice. The cost of the interface and software is modest with respect to quality, so if your interests lie in this direction, the product can certainly be recommended.

Technical Software also have a log book available (a mini-database with printer output) which is menu-driven, and a very good Morse Tutor: the latter allows characters to be taught in a simple manner; text may be typed at pre-selected speed, checked, errors highlighted and the result printed. A pitch adjustor is built into the system. The log book costs £8 on tape and the Morse Tutor £6 Add £2 to either for disk-based systems.

Touchline:
Product: *Transceive Interface TIFI and RX-4 Software.*
Supplier: *Technical Software. Fron, Upper Llandwrog, Caernarfon LL54 7RF.* ***Tel:*** *(0286) 881886.* ***Price:*** *Interface £25; Kit Form £15. Software £25 (ca); £27 (disk).* YC

Sprite Grabber

Want to use sprites from other programmes in your own games? This utility makes it easy for you to find and save them for later use.

By J. MacDonald

Sprite Grabber is a useful utility for examining the sprites used in games. The sprites once found can be SAVEd to disk or tape, LOADed back into some form of sprite editor and changed at will. In this way you can build up a library of your favourite sprites from your favourite programs.

Getting it in

Sprite Grabber is a machine code program, presented here as two Basic Loaders. These should be typed in using the SYNTAX CHECKER program that can be found on the LISTINGS page.

Why two versions of the program? It's simply that they are both located at different addresses, in case one happens to sit in the same area of memory as the sprites you want to grab.

When the loaders have been RUN I suggest that you SAVE the machine code using a monitor or one of the following small Basic programs:

For the version at address 49152:

10 POKE 43, 0: POKE 44, 192

20 POKE 45, 198: POKE 46,35

For the version at address 16384:

10 POKE 43, 0: POKE 44,64

20 POKE 45, 70: POKE 46, 64

Then SAVE the programs with:

SAVE "SPRITE GRABBER", X, 1

...where X is 1 if using tape or 8 if using disk.

The programs should be LOADed back to the address from where they were SAVEd to avoid corrupting any sprite data that may sit in the Basic area. You do this with the following command:

LOAD "SPRITE GRABBER", X, 1

...where X is as before.

Using the program

LOAD in the game with the sprites that you wish to examine. Once LOADed and RUNning reset the computer using a reset switch, or a cartridge with a reset on it. LOAD the SPRITE GRABBER program into memory at the address of your choice (49152 or 16384) and run the program with:

SYS start address

...where the start address is either 49152 or 16384 depending on the version of the program that you choose to use.

A menu will now appear on the screen showing what the function keys do, 'R' and 'S' options and sprite information at the bottom.

The function keys will allow the sprite pointer to be increased or decreased by one, sprite colours to be changed, toggling between multicolour and hi-res mode and toggling the XY expansion of the sprite. BANK switching is achieved by pressing numeric keys 0-3 as shown on the screen. At all times the sprite pointer, BANK and sprite address is displayed on the screen.

If you find a series of sprites that you like, which might be an animation, like a man walking, use F1 to display the first sprite in the series, and then press 'R' to save the start pointer. Now use F1 to move the sprite pointer to the last sprite you want to save and press 'R' again to indicate the end of the series. Pressing 'S' will now activate the SAVE section of the program. This will prompt you for Tape or Disk — press the appropriate letter and you will be asked for a filename (16 characters max). Your series of sprites will now be SAVEd.

If you try to SAVE from a high to a low address you will be notified of an error — press any key to try again.

Sprites can be SAVEd from anywhere in memory, including under the ROMs. So remember, unless you are loading the sprites from a program which will redirect them to a new address, they will LOAD into the area they originally came from — with possibly unforeseen results.

```
PROGRAM: GRABBER 16384

6F  10 I=16384:
2E  20 READ A:IF A=256 THEN END
57  30 POKE I,A:I=I+1:GOTO 20
E3  16384 DATA 169,0,141,249,7,1
    41,250,7
47  16392 DATA 141,251,7,141,32,
    208,141,33
0D  16400 DATA 208,141,29,208,14
    1,23,208,169
15  16408 DATA 1,141,21,208,141,
    39,208,169
D1  16416 DATA 64,141,0,208,169,
    100,141,1
7C  16424 DATA 208,169,6,141,38,
    208,169,8
41  16432 DATA 141,37,208,32,210
    ,255,169,13
76  16440 DATA 141,248,7,169,0,1
    33,252,169
E5  16448 DATA 0,133,253,169,64,
    133,53,169
86  16456 DATA 3,133,54,169,109,
    133,250,169
82  16464 DATA 64,133,251,169,14
    7,32,210,255
6F  16472 DATA 160,0,177,250,240
    ,12,32,210
92  16480 DATA 255,230,250,208,2
    45,230,251,76
D0  16488 DATA 90,64,76,225,66,1
    49,32,83
15  16496 DATA 80,82,73,84,69,32
    ,71,82
89  16504 DATA 65,66,66,69,82,32
    ,66,89
3B  16512 DATA 32,74,65,77,69,83
    ,32,77
4E  16520 DATA 65,67,68,79,78,65
    ,76,68
E4  16528 DATA 32,49,57,56,54,13
    ,17,32
84  16536 DATA 152,184,184,184,1
    84,184,184,184
97  16544 DATA 184,184,184,184,1
    84,184,184,184
9F  16552 DATA 184,184,184,184,1
    84,184,184,184
A7  16560 DATA 184,184,184,184,1
    84,184,184,184
96  16568 DATA 184,184,184,184,1
    84,184,184,13
A0  16576 DATA 17,32,32,32,32,32
```

```
   ,32,32
BF 16584 DATA 32,32,32,32,32,32
   ,32,32
93 16592 DATA 32,32,32,31,70,49
   ,149,45
63 16600 DATA 73,78,67,32,83,80
   ,82,73
AA 16608 DATA 84,69,32,80,79,73
   ,78,84
BD 16616 DATA 69,82,13,32,32,32
   ,32,32
27 16624 DATA 32,32,32,32,32,32
   ,32,32
D4 16632 DATA 32,32,32,32,32,31
   ,70,50
AF 16640 DATA 149,45,68,69,67,3
   2,83,80
AA 16648 DATA 82,73,84,69,32,80
   ,79,73
A3 16656 DATA 78,84,69,82,13,32
   ,32,32
06 16664 DATA 32,32,32,32,32,32
   ,32,32
8D 16672 DATA 32,32,32,32,32,32
   ,32,31
03 16680 DATA 70,51,149,45,73,7
   8,67,32
76 16688 DATA 83,80,82,73,84,69
   ,32,67
82 16696 DATA 79,76,35,48,13,32
   ,32,32
2E 16704 DATA 32,32,32,32,32,32
   ,32,32
35 16712 DATA 32,32,32,32,32,32
   ,32,31
38 16720 DATA 70,52,149,45,73,7
   8,67,32
3E 16728 DATA 83,80,82,73,84,69
   ,32,67
7D 16736 DATA 79,76,35,49,13,32
   ,32,32
56 16744 DATA 32,32,32,32,32,32
   ,32,32
9D 16752 DATA 32,32,32,32,32,32
   ,32,31
01 16760 DATA 70,53,149,45,73,7
   8,67,32
06 16768 DATA 83,80,82,73,84,69
   ,32,67
9A 16776 DATA 79,76,13,32,32,32
   ,32,32
3E 16784 DATA 32,32,32,32,32,32
   ,32,32
81 16792 DATA 32,32,32,32,32,31
   ,70,54
3F 16800 DATA 149,45,84,79,71,7
   1,76,69
A5 16808 DATA 32,77,85,76,67,32
   ,32,5
90 16816 DATA 79,70,70,13,32,32
   ,32,32
A6 16824 DATA 32,32,32,32,32,32
   ,32,32
AF 16832 DATA 32,32,32,32,32,32
   ,31,70
A8 16840 DATA 55,149,45,84,79,7
   1,71,76
61 16848 DATA 69,32,88,32,69,88
   ,80,65
BA 16856 DATA 78,68,13,32,32,32
   ,32,32
4E 16864 DATA 32,32,32,32,32,32
   ,32,32
D3 16872 DATA 32,32,32,32,32,31
   ,70,56
EF 16880 DATA 149,45,84,79,71,7
   1,76,69
BE 16888 DATA 32,89,32,69,88,80
   ,65,78
02 16896 DATA 68,13,17,17,17,17
   ,75,69
4E 16904 DATA 89,83,32,48,45,51
   ,32,84
FC 16912 DATA 79,32,83,87,73,84
   ,67,72
E7 16920 DATA 32,66,65,78,75,83
   ,13,39
C2 16929 DATA 83,39,32,84,79,32
   ,83,65
7A 16936 DATA 86,69,32,83,80,82
   ,73,84
3F 16944 DATA 69,83,32,66,69,84
   ,87,69
62 16952 DATA 69,78,32,77,65,82
   ,75,69
D3 16960 DATA 82,83,13,39,82,39
   ,32,84
DC 16968 DATA 79,32,83,69,84,32
   ,82,65
B5 16976 DATA 78,71,69,32,79,70
   ,32,83
2B 16984 DATA 80,82,73,84,69,83
   ,32,70
03 16992 DATA 79,82,32,83,65,86
   ,69,13
68 17000 DATA 17,151,67,85,82,8
   2,69,78
6A 17008 DATA 84,32,66,65,78,75
   ,32,32
6F 17016 DATA 32,73,83,32,32,5,
   48,32
7F 17024 DATA 32,32,32,32,32,31
   ,77,65
3F 17032 DATA 82,75,69,82,83,13
   ,32,32
85 17040 DATA 32,32,32,32,32,32
   ,32,32
CD 17048 DATA 32,32,32,32,32,32
   ,32,32
A9 17056 DATA 32,32,32,32,32,32
   ,32,5
9F 17064 DATA 70,82,79,77,32,32
   ,32,84
13 17072 DATA 79,151,13,83,80,8
   2,73,84
9F 17080 DATA 69,32,80,79,73,78
   ,84,69
14 17088 DATA 82,32,73,83,32,32
   ,5,48
01 17096 DATA 151,13,17,83,80,8
   2,73,84
AE 17104 DATA 69,32,65,68,68,82
   ,69,83
AD 17112 DATA 83,32,73,83,32,32
   ,5,48
4B 17120 DATA 0,120,169,52,133,
   1,160,63
E9 17128 DATA 177,252,145,53,13
   6,16,249,169
7E 17136 DATA 55,133,1,88,24,16
   2,23,160
7B 17144 DATA 26,32,240,255,32,
   60,68,169
94 17152 DATA 0,174,250,7,32,20
   5,189,24
48 17160 DATA 162,23,160,32,32,
   240,255,32
92 17168 DATA 60,68,169,0,174,2
   51,7,32
23 17176 DATA 205,189,32,228,25
   5,240,251,201
79 17184 DATA 83,208,3,76,120,6
   8,201,82
F9 17192 DATA 208,3,76,172,69,2
   01,133,208
DB 17200 DATA 8,169,1,141,21,68
   ,76,28
8C 17208 DATA 68,201,137,208,8,
   169,255,141
81 17216 DATA 21,68,76,28,68,20
   1,134,208
A8 17224 DATA 3,238,37,208,201,
   138,208,3
34 17232 DATA 238,38,208,201,13
   5,208,3,238
90 17240 DATA 39,208,201,139,24
   0,126,201,136
3A 17248 DATA 240,100,201,140,2
   40,107,201,48
FD 17256 DATA 208,5,169,0,76,13
   5,67,201
E5 17264 DATA 49,208,5,169,64,7
   6,135,67
5A 17272 DATA 201,50,208,5,169,
   128,76,135
CB 17280 DATA 67,201,51,208,5,1
   69,192,141
BF 17288 DATA 22,68,32,85,68,16
   5,253,41
51 17296 DATA 63,13,22,68,133,2
   53,24,162
EF 17304 DATA 24,160,19 32,240,
   255,32,60
36 17312 DATA 68,165,253,166,25
   2,32,205,189
84 17320 DATA 165,253,74,74,74,
   74,74,74
44 17328 DATA 141,20,68,24,162,
   20,160,19
D1 17336 DATA 32,240,255,174,20
   ,68,169,0
60 17344 DATA 32,205,189,76,225
   ,66,173,29
C3 17352 DATA 208,73,255,141,29
   ,208,76,225
07 17360 DATA 66,173,23,208,73,
   255,141,23
19 17368 DATA 208,76,225,66,173
   ,28,208,73
BB 17376 DATA 255,141,28,208,24
   ,162,9,160
B4 17384 DATA 34,32,240,255,162
   ,2,173,28
CC 17392 DATA 208,41,1,240,12,1
   89,16,68
16 17400 DATA 32,210,255,202,16
   ,247,76,225
47 17408 DATA 66,189,13,68,32,2
   10,255,202
E1 17416 DATA 16,247,76,225,66,
   70,70,79
48 17424 DATA 32,78,79,64,0,1,0
   ,0
6A 17432 DATA 0,0,0,0,24,173,24
   9,7
67 17440 DATA 109,21,68,141,249
   ,7,24,162
DA 17448 DATA 22,160,19,32,240,
   255,32,60
E3 17456 DATA 68,174,249,7,169,
   0,32,205
5A 17464 DATA 189,76,138,67,162
   ,12,189,72
4E 17472 DATA 68,32,210,255,202
   ,16,247,96
D1 17480 DATA 5,157,157,157,157
   ,157,157,32
C5 17488 DATA 32,32,32,32,32,16
   2,5,173
0B 17496 DATA 249,7,141,118,68,
   169,0,141
BA 17504 DATA 119,68,14,118,68,
   46,119,68
32 17512 DATA 202,16,247,173,11
   9,68,133,253
2D 17520 DATA 174,118,68,134,25
   2,96,0,0
69 17528 DATA 173,25,68,205,27,
   68,144,52
EA 17536 DATA 240,3,76,141,68,1
   73,24,68
A9 17544 DATA 205,26,68,144,39,
   32,163,69
EC 17552 DATA 162,0,189,165,68,
   32,210,255
E0 17560 DATA 232,224,15,208,24
   5,32,228,255
0F 17568 DATA 240,251,76,131,69
   ,73,78,86
```

```
AD  17576 DATA 65,76,73,68,32,77
    ,65,82
70  17584 DATA 75,69,82,83,169,0
    ,141,21
05  17592 DATA 208,32,163,69,162
    ,0,189,230
DA  17600 DATA 69,32,210,255,232
    ,224,16,208
1A  17608 DATA 245,32,228,255,24
    0,251,201,84
F7  17616 DATA 208,5,162,1,76,22
    1,68,201
47  17624 DATA 68,208,238,162,8,
    169,1,160
48  17632 DATA 255,32,186,255,16
    2,0,142,50
4C  17640 DATA 69,189,246,69,32,
    210,255,232
80  17648 DATA 224,13,208,245,16
    2,0,169,113
5E  17656 DATA 32,210,255,32,228
    ,255,240,251
34  17664 DATA 201,13,240,81,201
    ,20,240,14
76  17672 DATA 201,31,176,3,76,2
    51,68,201
E9  17680 DATA 127,144,32,76,251
    ,68,173,50
ED  17688 DATA 69,240,224,160,0,
    185,46,69
F5  17696 DATA 32,210,255,200,19
    2,4,208,245
01  17704 DATA 206,50,69,76,246,
    68,157,32
0B  17712 DATA 157,157,0,72,173,
    50,69,201
23  17720 DATA 16,208,4,104,76,2
    51,68,169
38  17728 DATA 157,32,210,255,17
    3,50,69,170
8D  17736 DATA 104,157,21,70,32,
    210,255,238
74  17744 DATA 50,69,76,246,68,1
    69,13,162
36  17752 DATA 3,32,210,255,202,
    16,250,173
65  17760 DATA 50,69,162.21,160,
    70,32,189
43  17768 DATA 255,173,24,68,133
    ,250,173,25
62  17776 DATA 68,133,251,174,26
    ,68,172,27
72  17784 DATA 68,169,250,32,216
    ,255,169,1
6B  17792 DATA 141,21,208,32,163
    ,69,160,10
25  17800 DATA 162,18,189,2,70,3
    2,210,255
46  17808 DATA 202,16,247,136,16
    ,242,169,32
C0  17816 DATA 162,160,157,223,5
    ,202,208,250
C3  17824 DATA 76,225,66,24,162,
    5,160,0
26  17832 DATA 32,240,255,96,173
    ,23,68,208
0D  17840 DATA 24,173,249,7,141,
    250,7,165
CE  17848 DATA 252,141,24,68,165
    ,253,141,25
28  17856 DATA 68,169,1,141,23,6
    8,76,225
1E  17864 DATA 66,173,249,7,141,
    251,7,24
43  17872 DATA 165,252,105,64,14
    1,26,68,165
DF  17880 DATA 253.105,0,141,27,
    68,169,0
8D  17888 DATA 141,23,68,76,225,
    66,40,84
DB  17896 DATA 41,65,80,69,32,79
    ,82,32
C3  17904 DATA 40,68,41,73,83,75
    ,13,70
0A  17912 DATA 73,76,69,78,65,77
    ,69,32
51  17920 DATA 63,17,13,32,32,32
    ,32,32
C1  17928 DATA 32,32,32,32,32,32
    ,32,32
09  17936 DATA 32,32,32,32,32,32
    ,32,32
51  17944 DATA 32,32,32,32,32,32
    ,32,32
75  17952 DATA 32,0,255,256
```

PROGRAM: GRABBER 49152

```
6C  10 I=49152:
2E  20 READ A:IF A=256 THEN END
57  30 POKE I,A:I=I+1:GOTO 20
63  49152 DATA 169,0,141,249,7,1
    41,250,7
C7  49160 DATA 141,251,7,141,32,
    208,141,33
8D  49168 DATA 208,141,29,208,14
    1,23,208,169
95  49176 DATA 1,141,21,208,141,
    39,208,169
51  49184 DATA 64,141,0,208,169,
    100,141,1
FC  49192 DATA 208,169,6,141,38,
    208,169,8
C1  49200 DATA 141,37,208,32,210
    ,255,169,13
F6  49208 DATA 141,248,7,169,0,1
    33,252,169
65  49216 DATA 0,133,253,169,64,
    133,53,169
06  49224 DATA 3,133,54,169,109,
    133,250,169
30  49232 DATA 192,133,251,169,1
    47,32,210,255
EF  49240 DATA 160,0,177,250,240
    ,12,32,210
12  49248 DATA 255,230,250,208,2
    45,230,251,76
98  49256 DATA 90,192,76,225,194
    ,149,32,83
95  49264 DATA 80,82,73,84,69,32
    ,71,82
09  49272 DATA 65,66,66,69,82,32
    ,66,89
BB  49280 DATA 32,74,65,77,69,83
    ,32,77
CE  49288 DATA 65,67,68,79,78,65
    ,76,68
64  49296 DATA 32,49,57,56,54,13
    ,17,32
04  49304 DATA 152,184,184,184,1
    84,184,184,184
17  49312 DATA 184,184,184,184,1
    84,184,184,184
1F  49320 DATA 184,184,184,184,1
    84,184,184,184
27  49328 DATA 184,184,184,184,1
    84,184,184,184
16  49336 DATA 184,184,184,184,1
    84,184,184,13
20  49344 DATA 17,32,32,32,32,32
    ,32,32
3F  49352 DATA 32,32,32,32,32,32
    ,32,32
13  49360 DATA 32,32,32,31,70,49
    ,149,45
E3  49368 DATA 73,78,67,32,83,80
    ,82,73
2A  49376 DATA 84,69,32,80,79,73
    ,78,84
3D  49384 DATA 69,82,13,32,32,32
    ,32,32
A7  49392 DATA 32,32,32,32,32,32
    ,32,32
54  49400 DATA 32,32,32,32,32,31
    ,70,50
2F  49408 DATA 149,45,68,69,67,3
    2,83,80
2A  49416 DATA 82,73,84,69,32,80
    ,79,73
23  49424 DATA 78,84,69,82,13,32
    ,32,32
86  49432 DATA 32,32,32,32,32,32
    ,32,32
0D  49440 DATA 32,32,32,32,32,32
    ,32,31
83  49448 DATA 70,51,149,45,73,7
    8,67,32
F6  49456 DATA 83,80,82,73,84,69
    ,32,67
02  49464 DATA 79,76,35,48,13,32
    ,32,32
AE  49472 DATA 32,32,32,32,32,32
    ,32,32
B5  49480 DATA 32,32,32,32,32,32
    ,32,31
B8  49488 DATA 70,52,149,45,73,7
    8,67,32
BE  49496 DATA 83,80,82,73,84,69
    ,32,67
FD  49504 DATA 79,76,35,49,13,32
    ,32,32
D6  49512 DATA 32,32,32,32,32,32
    ,32,32
1D  49520 DATA 32,32,32,32,32,32
    ,32,31
81  49528 DATA 70,53,149,45,73,7
    8,67,32
86  49536 DATA 83,80,82,73,84,69
    ,32,67
1A  49544 DATA 79,76,13,32,32,32
    ,32,32
BE  49552 DATA 32,32,32,32,32,32
    ,32,32
01  49560 DATA 32,32,32,32,32,31
    ,70,54
BF  49568 DATA 149,45,84,79,71,7
    1,76,69
25  49576 DATA 32,77,85,76,67,32
    ,32,5
10  49584 DATA 79,70,70,13,32,32
    ,32,32
26  49592 DATA 32,32,32,32,32,32
    ,32,32
2F  49600 DATA 32,32,32,32,32,32
    ,31,70
28  49608 DATA 55,149,45,84,79,7
    1,71,76
E1  49616 DATA 69,32,88,32,69,88
    ,80,65
3A  49624 DATA 78,68,13,32,32,32
    ,32,32
CE  49632 DATA 32,32,32,32,32,32
    ,32,32
53  49640 DATA 32,32,32,32,32,31
    ,70,56
6F  49648 DATA 149,45,84,79,71,7
    1,76,69
3E  49656 DATA 32,89,32,69,88,80
    ,65,78
82  49664 DATA 68,13,17,17,17,17
    ,75,69
CE  49672 DATA 89,83,32,48,45,51
    ,32,84
7C  49680 DATA 79,32,83,87,73,84
    ,67,72
67  49688 DATA 32,66,65,78,75,83
    ,13,39
42  49696 DATA 83,39,32,84,79,32
    ,83,65
FA  49704 DATA 86,69,32,83,80,82
    ,73,84
BF  49712 DATA 69,83,32,66,69,84
    ,87,69
E2  49720 DATA 69,78,32,77,65,82
    ,75,69
53  49728 DATA 82,83,13,39,82,39
```

```
     ,32,84
5C   49736 DATA 79,32,83,69,84,32
     ,82,65
35   49744 DATA 78,71,69,32,79,70
     ,32,83
AB   49752 DATA 80,82,73,84,69,83
     ,32,70
83   49760 DATA 79,82,32,83,65,86
     ,69,13
E8   49768 DATA 17,151,67,85,82,8
     2,69,78
EA   49776 DATA 84,32,66,65,78,75
     ,32,32
EF   49784 DATA 32,73,83,32,32,5,
     48,32
FF   49792 DATA 32,32,32,32,32,31
     ,77,65
BF   49800 DATA 82,75,69,82,83,13
     ,32,32
05   49808 DATA 32,32,32,32,32,32
     ,32,32
4D   49816 DATA 32,32,32,32,32,32
     ,32,32
29   49824 DATA 32,32,32,32,32,32
     ,32,5
1F   49832 DATA 70,82,79,77,32,32
     .32,84
93   49840 DATA 79,151,13,83,80,8
     2,73,84
1F   49848 DATA 69,32,80.79,73,78
     ,84,69
94   49856 DATA 82,32,73,83,32,32
     ,5,48
81   49864 DATA 151,13,17,83,80,8
     2,73,84
2E   49872 DATA 69,32,65,68,68,82
     ,69,83
2D   49880 DATA 83,32,73,83,32,32
     ,5,48
CB   49888 DATA 0,120,169,52,133,
     1,160,63
69   49896 DATA 177,252,145,53,13
     6,16,249,169
FE   49904 DATA 55,133,1,88,24,16
     2,23,160
49   49912 DATA 26,32,240,255,32,
     60,196,169
14   49920 DATA 0,174,250,7,32,20
     5,189,24
C8   49928 DATA 162,23,160,32,32,
     240,255,32
4E   49936 DATA 60,196,169,0,174,
     251,7,32
A3   49944 DATA 205,189,32,228,25
     5,240,251,201
AF   49952 DATA 83,208,3,76,120,1
     96,201,82
B5   49960 DATA 208,3,76,172,197,
     201,133,208
FF   49968 DATA 8,169,1,141,21,19
     6,76,28
B0   49976 DATA 196,201,137,208,8
     ,169,255,141
45   49984 DATA 21,196,76,28,196,
     201,134,208
28   49992 DATA 3,238,37,208,201,
     138,208,3
B4   50000 DATA 238,38,208,201,13
     5,208,3,238
10   50008 DATA 39,208,201,139,24
     0,126,201,136
BA   50016 DATA 240,100,201,140,2
     40,107,201,48
A5   50024 DATA 208,5,169,0,76,13
     5,195,201
A9   50032 DATA 49,208,5,169,64,7
     6,135,195
DA   50040 DATA 201,50,208,5,169,
     128,76,135
FB   50048 DATA 195,201,51,208,5,
     169,192,141
45   50056 DATA 22,196,32,85,196,
     165,253,41
D9   50064 DATA 63,13,22,196,133,
     253,24,162
6F   50072 DATA 24,160,19,32,240,
     255,32,60
72   50080 DATA 196,165,253,166,2
     52,32,205,189
04   50088 DATA 165,253,74,74.74.
     74,74,74
68   50096 DATA 141,20,196,24,162
     ,20,160,19
63   50104 DATA 32,240,255,174,20
     ,196,169,0
BA   50112 DATA 32,205,189,76,225
     ,194,173,29
43   50120 DATA 208,73,255,141,29
     ,208,76,225
7B   50128 DATA 194,173,23,208,73
     ,255,141,23
BD   50136 DATA 208,76,225,194,17
     3,28,208,73
3B   50144 DATA 255,141,28,208,24
     ,162,9,160
34   50152 DATA 34,32,240,255,162
     ,2,173,28
8C   50160 DATA 208,41,1,240,12,1
     89,16,196
96   50168 DATA 32,210,255,202,16
     ,247,76,225
D9   50176 DATA 194,189,13,196,32
     ,210,255,202
0D   50184 DATA 16,247,76,225,194
     ,70,70,79
C8   50192 DATA 32,78,79,64,0,1,0
     ,0
EA   50200 DATA 0,0,0,0,24,173,24
     9,7
9B   50208 DATA 109,21,196,141,24
     9,7,24,162
5A   50216 DATA 22,160,19,32,240,
     255,32,60
D7   50224 DATA 196,174,249,7,169
     ,0,32,205
B0   50232 DATA 189,76,138,195,16
     2,12,189,72
32   50240 DATA 196,32,210,255,20
     2,16,247,96
51   50248 DATA 5,157,157,157,157
     ,157,157,32
45   50256 DATA 32,32,32,32,32,16
     2,5,173
83   50264 DATA 249,7,141,118,196
     ,169,0,141
E2   50272 DATA 119,196,14,118,19
     6,46,119,196
BA   50280 DATA 202,16,247,173,11
     9,196,133,253
B1   50288 DATA 174,118,196,134,2
     52,96,0,0
35   50296 DATA 173,25,196,205,27
     ,196,144,52
CA   50304 DATA 240,3,76,141,196,
     173,24,196
F3   50312 DATA 205,26,196.144,39
     ,32,163,197
92   50320 DATA 162,0,189,165,196
     ,32,210,255
60   50328 DATA 232,224,15,208,24
     5,32,228,255
E9   50336 DATA 240,251,76,131,19
     7,73,78,86
2D   50344 DATA 65,76,73,68,32,77
     ,65,82
F0   50352 DATA 75,69,82,83,169,0
     ,141,21
55   50360 DATA 208,32,163,197,16
     2,0,189,230
96   50368 DATA 197,32,210,255,23
     2,224,16,208
9A   50376 DATA 245,32,228,255,24
     0,251,201,84
27   50384 DATA 208,5,162,1,76,22
     1,196,201
C7   50392 DATA 68,208,238,162,8,
     169,1,160
C8   50400 DATA 255,32,186,255,16
     2,0,142,50
C2   50408 DATA 197,189,246,197,3
     2,210,255,232
00   50416 DATA 224,13,208,245,16
     2,0,169,113
DE   50424 DATA 32,210,255,32,228
     ,255,240,251
B4   50432 DATA 201,13,240,81,201
     ,20,240,14
58   50440 DATA 201,31,176,3,76,2
     51,196,201
9D   50448 DATA 127,144,32,76,251
     ,196,173,50
E7   50456 DATA 197,240,224,160,0
     ,185,46,197
75   50464 DATA 32,210,255,200,19
     2,4,208,245
D5   50472 DATA 206,50,197,76,246
     ,196,157,32
9D   50480 DATA 157,157,0,72,173,
     50,197,201
B1   50488 DATA 16,208,4,104,76,2
     51,196,169
F4   50496 DATA 157,32,210;255,17
     3,50,197,170
16   50504 DATA 104,157,21,198,32
     ,210,255,238
A0   50512 DATA 50,197,76,246,196
     ,169,13,162
B6   50520 DATA 3,32,210,255,202,
     16,250,173
EE   50528 DATA 50,197,162,21,160
     ,198,32,189
81   50536 DATA 255,173,24,196.13
     3,250,173,25
20   50544 DATA 196,133,251,174,2
     6,196,172,27
56   50552 DATA 196,169,250,32,21
     6,255,169,1
BF   50560 DATA 141,21,208,32,163
     ,197,160,10
B0   50568 DATA 162,18,189,2,198,
     32,210,255
C6   50576 DATA 202,16,247,136,16
     ,242,169,32
40   50584 DATA 162,160,157,223,5
     ,202,208,250
B9   50592 DATA 76,225,194,24,162
     ,5,160,0
F6   50600 DATA 32,240,255,96,173
     ,23,196,208
8D   50608 DATA 24,173,249,7,141,
     250,7,165
00   50616 DATA 252,141,24,196,16
     5,253,141,25
70   50624 DATA 196,169,1,141,23,
     196,76,225
3A   50632 DATA 194,173,249,7,141
     ,251,7,24
19   50640 DATA 165,252,105,64,14
     1,26,196,165
3B   50648 DATA 253,105,0,141,27,
     196,169,0
05   50656 DATA 141,23,196,76,225
     ,194,40,84
5B   50664 DATA 41,65,80,69,32,79
     ,82,32
43   50672 DATA 40,68,41,73,83,75
     ,13,70
8A   50680 DATA 73,76,69,78,65,77
     ,69,32
D1   50688 DATA 63,17,13,32,32,32
     ,32,32
41   50696 DATA 32,32,32,32,32,32
     ,32,32
89   50704 DATA 32,32,32,32,32,32
     ,32,32
D1   50712 DATA 32,32,32,32,32,32
     ,32,32
F5   50720 DATA 32,0,255,256
```

commodore

AMIGA — FROM £475!*

- Amiga A500 TV with A521 TV/composite modulator £475*
- Amiga A500M with A1081 high-res colour monitor £695*

(*These prices require Commodore Amiga vouchers, valid until 12th September only) Prices include 15% VAT, a FREE copy of DeLuxe Paint, FREE delivery to your door, one year warranty. Overnight delivery £12

- Amiga A2000 with 1MB RAM, 880K 3.5" disk, mouse, software £1099
- Amiga A2000M: with A1081 high-res colour monitor £1399
- Amiga A2000 XTM As above, plus PC XT bridge board & floppy £1899
- Amiga A2000 HDM As A2000M plus 20MB AmigaDos hard disk £1999

1 YEAR ON-SITE MAINTENANCE WITH EVERY A2000 AMIGA SYSTEM... PLUS

FREE GOLDEN KEY CARD!

stay at over 200 top hotels as often as you like for a year, and for each night's stay, just pay for breakfast and dinner!

PERIPHERALS AMIGA

- A501 plug-in RAM/clock 512K £105
- A521 TV/composite modulator £25
- A1081 high-res colour monitor £335
- A1010 3.5" external disk drive £225
- Cumana 3.5" external disk drive £149
- A2010 3.5" internal disk drive £199
- A2052 2MB internal RAM £399
- A2088 PC-XT bridge board with 5.25" internal disk drive £529
- A2286 PC-AT bridge board with 5.25" internal disk drive £749
- A2090PC 20MB internal hard disk with MS DOS controller £529
- A2090 20MB internal hard disk with Amiga DOS controller £629
- MegaBoard 2MB add-on RAM £469
- Xerox 4020 colour printer £1219
- HP LaserJet laser printer £1995
- HP LaserJet Plus £2995

CREATIVITY AMIGA

- VizaWrite DeskTop £139.95
- Word Perfect 289.95
- City Desk 139.95
- Page Setter 99.95
- Scribble II £89.95
- DigiPaint 59.95
- De Luxe Paint II 119.95
- De Luxe Video II 119.95
- Aegis VideoScape 179.95
- Aegis Animator 99.95
- De Luxe Music 84.95
- Sophus stereo sound digitiser 139.95
- SoundScape Pro Midi Studio 154.95

PRODUCTIVITY AMIGA

- SuperBase Personal £89.95
- Acquisition 274.95
- Logistix 139.95
- Analyse II 94.95
- SAM Basic 89.95
- True Basic £59.95
- True Basic libraries 39.95
- K-Seka Assembler 64.95
- MCC Pascal 74.95
- A/C Fortran 249.95
- Lattice C 3.1 144.95
- Aegis Draw Plus 214.95
- Dynamic CAD 389.95
- Cherry A3 Digitizing Tablet 549.95
- Easyl A4 Drawing Tablet 414.95

128 64C

- Commodore 128D computer £435
- Commodore 128 computer £239
- 512K expansion RAM £149
- Commodore 1571 disk drive £239
- 1901C colour monitor £275
- 64C computer £189
- 1541C disk drive £189
- 64C Connoisseur Collection £245

Prices include 15% VAT, FREE delivery to your door, and one year warranty. Please add £12 for overnight delivery.

UNBEATABLE SUPERBASE & SUPERSCRIPT BARGAINS!

- SuperBase 128 ~~99.95~~ £44.95
- SuperScript 128 ~~89.95~~ 44.95
- SuperBase: The Book 11.95
- SuperBase 64 & Plus/4 ~~79.95~~ £34.95
- SuperScript 64 ~~69.95~~ 34.95
- SuperBase Starter 64 ~~39.95~~ 19.95

MORE SOFTWARE BARGAINS FOR YOUR C64 AND 128!

- VizaWrite Classic 128 ~~99.95~~ £79.95
- VizaWrite 64 (disk) ~~59.95~~ 39.95
- VizaWrite 64 (cartridge) ~~89.95~~ 69.95
- VizaStar 128 ~~129.95~~ 99.95
- VizaStar 64 XL8 ~~99.95~~ 79.95
- VizaStar 64 XL4 ~~79.95~~ 69.95
- GEOS 64 V1.3 ~~49.95~~ £44.95
- SwiftCalc 128 ~~59.00~~ 54.95
- Data Manager 128 ~~59.00~~ 54.95
- WordWriter 128 ~~59.95~~ 54.95
- Pocket Planner 128 ~~49.95~~ 44.95
- MicroClerk 128 ~~99.95~~ 94.95

COMMODORE 128 and 64... PROGRAMMER'S CORNER

PetSpeed 128	The Basic 128 compiler, from Oxford Systems	~~49.95~~	£42.95
Oxford Pascal 128	The complete J & W Pascal for your 128	~~49.95~~	42.95
Super C 128	Complete C language, with extensions	~~59.95~~	42.95
Cobol 128	The complete COBOL package from Abacus	~~39.95~~	32.95
Hack Pack 128	All-in-one Programmer's Toolkit & Ram-Disk	~~39.95~~	36.95
RamDos 128	Lightning fast Ram-Disk for 512K expansion RAM		32.95
C128 Tricks and Tips	Essential reading for the 128 programmer	~~12.95~~	9.95
BrainBox IEEE	Supports IEEE/PET disks & printers etc. (128 & 64)		79.95
Super Disk Doc	Rescue your lost disk data! (1541/70/71, 4040)	~~19.95~~	14.95
Simon's Basic 64	Programmer's cartridge from Commodore	~~50.00~~	39.95
PetSpeed 64	The standard 64 Basic compiler from Oxford	~~34.95~~	19.95
Oxford Basic 64	All-in-one Basic compiler, toolkit, compressor	~~39.95~~	29.95
Oxford Pascal 64	The complete J & W Pascal for your 64	~~49.95~~	34.95
Oxford Pascal 64 (tape)	Pascal for 64 tape users, as above	~~22.95~~	19.95
Super C 64	Complete C language, with extensions	~~59.95~~	42.95
Cobol 64	The complete COBOL package from Abacus	~~39.95~~	32.95

IF YOU WANT IT TOMORROW... CALL US TODAY! ON 01-546-7256

Prices are POST FREE & include VAT. Order by phone with your credit card, or send cheque/PO or your credit card number. Official orders welcome. We despatch same day by FIRST CLASS post. If our lines are busy, why not try our 24-hour recorded order service, on 01-541-5185. Ref. A50

Calco Software

LAKESIDE HOUSE, KINGSTON HILL, SURREY, KT2 7QT. TEL 01-546-7256

YORK ELECTRONIC RESEARCH

Commodore 64/PLUS 4 Products

6502 ASSEMBLER C64/PLUS 4* tape/disk* £12.99

A sophisticated two-pass symbolic assembler and text editor which supports tape and disk filing. The assembler, the editor and your source and object code may all be resident in memory simutaneously, facilitating rapid and interactive code development. Recently extended manual with many examples.

Z80 EMULATOR/CROSS-ASSEMBLER C64 ONLY disk £12.99

A unique integrated Z80 development package. The emulator compiles Z80 source code into optimised 6502 which runs on the 64 at approx. one sixth the speed of a 2MHz Z80. It supports all but 20 of the 688 Z80 operations, calls to 6502 routines, and interrupts. The cross assembler generates hex or binary Z80 object files. The disk also contains a powerful editor and several example programs.

BI-DIRECTIONAL RS232 INTERFACE WITH COMMS. SOFTWARE C64/PLUS 4 * tape/disk * £29.99

The 64 KERNAL supports RS232 via the user port. This interface provides the necessary voltage conversion for direct connection to RS232 printers, modems and other devices. It is compatible with Easyscript and Superscript. The unit is supplied with 1 metre of cable (add 75p per extra metre*) terminated in a 25-way male (or female*) D-connector. The software includes a terminal emulator which supports split baud rates and auto-dial, file transfer utilities, a menu driven port initialisation program, and a transparent printer driver which vectors the KERNAL to redirect device 4 printer output to the RS232 port.

*Please specify.

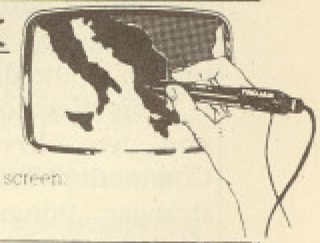
Prices are fully inclusive. Overseas orders add £2.50 Allow up to 1 week for delivery. Manuals available separately at £1.00 each.

YORK ELECTRONIC RESEARCH
The Fishergate Centre, 4 Fishergate, York YO1 4AB
Telephone: (0904) 610722

Come & see us at THE PCW SHOW 23–27 September

CADMASTER™

THE ULTIMATE GRAPHICS PACK



SUPERB GRAPHICS SOFTWARE
PLUS
A QUALITY LIGHT PEN

Discover the exciting world of creating your own graphics on screen.

Look at these options:—

	AMSTRAD CPC464/664/6128 COLOUR MONITOR	COMMODORE 64/128	PLUS4	C16	VIC 20 (NEEDS SUPER EXPANDER)	SPECTRUM	DRAGON 32/64 TANDY COLOUR 32/64
FREEHAND DRAW	✓	✓	✓	—	✓	✓	✓
DRAW BOX	✓	✓	✓	✓	✓	✓	✓
DRAW CIRCLE	✓	✓	✓	✓	✓	✓	✓
DRAW LINE	✓	✓	✓	✓	✓	✓	✓
DRAW TRIANGLE	✓	✓	✓	✓	—	✓	—
DRAW RAYS	✓	✓	✓	✓	✓	✓	—
PEN THICKNESSES	1	5	5	1	1	4	1
PEN QUILLS	—	3	3	—	—	2	—
PAINT BRUSH	—	✓	✓	—	✓	✓	—
TEXT	✓	✓	✓	—*	✓	✓	✓
PIN POINT ACCURACY	✓	✓	✓	✓	✓	✓	—
ACTIVE BANDING	—	✓	✓	—	—	✓	—
COPY FUNCTION	✓	✓	✓	—	—	✓	—
WASH	—	✓	✓	—	—	✓	—
COLOURS	27	16	121	121	16	8	4
FILL	✓	✓	✓	✓	✓	✓	✓
FILL PATTERNS	5	11+5	11+5	5	—	7+5	5
ERASE FUNCTIONS	—	✓	✓	—	—	✓	✓
SAVE SCREEN	✓	✓	✓	✓	✓	✓	✓
PRINTER DUMP	✓	✓	✓	✓	—	✓	—
PROGRAM FORMAT	C/D	C/D	C/D	C/D	C/D	C#	C
RETAIL PRICE	£14.95	£19.95	£19.95		£19.95	£19.95	£17.25

This powerful PROGRAM + a QUALITY LIGHT PEN and an INSTRUCTION BOOKLET in one reasonably priced package.
Easy to use by all ages for creating colourful pictures or technical drawings.
Full back-up service from the manufacturers.

TROJAN

Trojan Products, 166, Derlwyn, Dunvant, Swansea SA2 7PF Tel (0792) 205491

Hook-Ups

Continuing our series, we look at the possibilities of using the BBC as an intelligent disk drive interface between the C64 and itself.

By Mycroft Appleby

Last month I explained the general principals of parallel communications, the terminology, and the method that I was going to use in the series. Also I included as an example, a simple memory transfer program for the C64 and BBC micro.

This month I'll look at a more practical application of the system. If there are two things that are different in the C64 and BBC Micro it is speed, and more specifically disk speed. The BBC Micro has one of the fastest and cheapest disk systems on any home micro. The Commodore 64 on the other hand doesn't have disk drives at all. Oh, they may look like disk drives. But in reality there are little hamsters inside that disk drive shaped box, that listen to the information coming down the serial bus and scratch it on the surface of the disk in shorthand.

This breed of hamster is very rare and was bred specifically by Commodore for the task. One of the stranger things about this breed (Hamstradus Floppus) is that they live on the paper envelopes that disks usually come in. If you don't believe me, count the number of disks that you've got, then count the number of envelopes – see! Further proof is evident when you swap disks in the middle of a 'read or write' operation. The miniature hamsters hammer on the roof of the box to get you to stop.

So with these two things in mind, it should be possible to use the BBC Micro as an intelligent disk drive interface between the C64 and the BBC Disk Drive, all you need is some clever software and the appropriate transmition protocol.

There is a small Basic program in the C64 and the main program on the BBC Micro. This is for two main reasons. Firstly you can load 1K of data into a BBC Micro and then port it onto a C64 a lot faster problems that you get with Basic getting confused with machine code. The second reason is that this series isn't designed to give complete solutions to problems, but rather to supply the tools and the information to do the job. For this the code must be in Assembler format rather than strings of hex digits, so that you can see how it works. Most C64 assemblers are incompatible with each other and interfere with the system to such a degree that once the assembler has taken a chunk out of the memory map and written all over the pointers you haven't a clue where you are.

So the program is in the standard BBC format assembler. The C64 boot program is only slightly different from the one published last month, only locations and amounts have been changed. Some of the code on the BBC side may also be familiar, as I used many of the principals which were discussed last month.

Starting Up

To load the software into both machines, first load "Boot" into the Commodore 64 and load "Disk" into the BBC Micro. Run "Boot" and then run "Disk". After about 35 seconds the code will have assembled into the BBC, been transferred to the C64 and then the BBC side will have been re-assembled and initialised for the BBC.

On the BBC screen at this point you will see a message indicating the buffer size and a number. This is the number of bytes in the buffer and indicates the maximum program size you can load or save plus 256 bytes for the header packet (which I've explained later). Do not excede this. To increase the buffer size, most of the error checking has been removed.

On the C64 side you should have returned to the "Ready." prompt. Typing 'SYS 49152' in the time honoured way will initialise the system.

At this point the vectors inside the machine that handle the loading and saving will have been slightly altered. Tape and disk (if appropriate) will work as normal, as will all other device addresses except '8'. This will transfer your program onto the BBC's currently selected drive in the blink of an eye. Likewise loading with a device number of '8' will load from the disk into memory as normal. Verifying is not possible however, due to the 'burst' transmition of the data (i.e. the data goes back and forth in one great chunk and it is difficult to compare it on a 'byte for byte' basis).

Alterations

If you have a disk drive already attached and want to use it also, then you can change the device number of the BBC very simply. In the sections '.BLODE' and '.BSAV' in the C64 half of the program you will see that the memory location 'device' is compared to '&08'. This is the device number. Change this to whatever number you want above three (the system's choice, not mine) and you are there. A good choice (and one I use myself) is seven as not a great deal seems to use this device number.

How it works

Remember how last month in the header packet of the transmitted data, as well as where to and how long, the packet also had a byte called 'cmd'. Well, this is the command byte. In this new system when the data comes flooding into the BBC, it looks at this byte and if it is a one it knows to save the data. The first 256 bytes of the data is special and holds various

information about the data, including the name it is to be saved under. This is extracted and the data is saved.

If the cmd number is two, then that is a load request. In this case only the 256 byte header packet is sent, complete with various information about the program, as well as its name again. The C64 then just sits there and waits. In this program it doesn't return to Basic, but you can have it so you get full Basic control right away and the program just appears in memory when it's ready. This system works well but needs a lot of care to operate it; '.1loop' is the area to watch. Change the finishing off to operate in the IRQ loop and perform a manual relink and you are away – parallel processing at last.

However, back to the plot. When the BBC has found the program on disk, it prepares a packet with a cmd of three and sends it to the C64. The C64 knows that three means 'incoming program data' and treats it accordingly.

A cmd of zero will force a memory dump in any direction, just follow the instructions for last month. this is amusing for swapping screens and messages, or changing somebodies character set.

Protocols

The transfer packet looks like this:

data lo \ Address where data is going
data hi /

len lo \ Length of data.
len hi /

cmd Command Byte.

The program packet (first 256 bytes) looks like this:

Header +	Name	Function
0	sa	Secondary address
1	drive	Destination drive (unused)
2-18	name	Filename
19-20	start	Origin start address of program
21-22	end	Origin end address of program
23-255	free	Reserved for future expansion

Next Time

I hope this system is of some use, I can't abide my hamster drives any more, the BBC drive is so much faster. Next installment I'll see what else I can dream up.

PROGRAM: BOOT

```
 5 REM C64/BBC BOOT PROGRAM
 10 POKE56579,0:X=PEEK(56589)
 20 POKE56576,147:L=49152
 30 FORB=0TO1023
 40 IF(PEEK(56589)AND16)=0THEN40
 50 I=PEEK(56577):POKEL+B,I
 60 POKE56576,151:POKE56576,147
 70 NEXTB
 80 END
```

```
   10REM*************************
***
   20REM**
 **
   30REM**           Beeb-Disk
 **
   40REM**
 **
   50REM**    C64 to  BBC Micro
 **
   60REM**    and disk drive
 **
   70REM**    system.
 **
   80REM**
 **
   90REM**  Mycroft Appleby 1987
 **
  100REM**
 **
  110REM*************************
***
  120:
  130CLS:PRINT"Buffer space avai
lable = ";HIMEM-PAGE-&0400
  140DIM CODE &0800,C64code &080
0
  150irq2v=&206:oldv=&F8:flag=&7
0:port=&FE60
  160ddr=port+2:pcr=port+12:ifr=
port+13:ier=port+14
  170FOR PASS=0 TO 2 STEP 2
  180P%=CODE
  190[OPT PASS
  200.setup sei
  210lda irq2v
  220sta oldv
  230lda irq2v+1
  240sta oldv+1
  250lda #newv MOD 256
  260sta irq2v
  270lda #newv DIV 256
  280sta irq2v+1
  290lda #128+16
  300sta ier
  310cli
  320rts
  330\
  340.RESET sei
  350lda oldv
  360sta irq2v
  370lda oldv+1
  380sta irq2v+1
  390cli
  400rts
  410\
  420.newv lda ifr
  430and #128+16
  440cmp #&00
  450beq finirq
  460sta ifr
  470lda #&01
  480sta flag
  490.finirq jmp (oldv)
  500\
  510.get lda #00
  520sta flag
  530.loop1 lda flag
  540beq loop1
  550lda #&00
  560sta flag
  570rts
  580\
  590.TRANSFER jsr setup
  600lda #255
  610sta ddr
  620lda #128+64+32
  630sta pcr
  640ldx #&00
  650.loop2 lda C64code,X
  660jsr wbyte
  670jsr get
  680inx
  690bne loop2
  700.loop3 lda C64code+256,X
  710jsr wbyte
  720jsr get
  730inx
  740bne loop3
  750.loop4 lda C64code+512,X
  760jsr wbyte
  770jsr get
  780inx
  790bne loop4
  800.loop5 lda C64code+768,X
  810jsr wbyte
  820jsr get
  830inx
  840bne loop5
  850rts
  860\
  870.wbyte sta port
  880lda #128+64
  890sta pcr
  900lda #128+64+32
  910sta pcr
  920rts
  930]
  940NEXT PASS
  950:
  960REM Start of C64 code to be
 ported
  970:
  980port=&DD01:ddr=&DD03:pa2=&D
D00:flag1=&DD0D
  990data=&F7:len=&F9:from=&FB:i
mage=&0338:half=&0339:cmd=&033A
 1000irqv=&0314:oldirqv=&0334:lo
adv=&0330:savev=&0332
 1010CSAV=&F5ED:sa=&B9:flen=&B7:
BAD_NAME=&F710:SAV_MSG=&F68F:sad
d=&C1
 1020eadd=&AE:device=&BA:header=
&CF00:name=&BB
 1030bstart=&2B:LD_MSG=&F5D2:CLO
DE=&F4A5:NO_FILE=&F713:lv=&93
 1040FOR PASS=4 TO 6 STEP 2
 1050P%=&C000:O%=C64code
 1060[OPT PASS
 1070.SETUP sei
 1080ldx irqv
 1090stx oldirqv
 1100ldx irqv+1
 1110stx oldirqv+1
 1120ldx #(NEWIRQ MOD 256)
 1130stx irqv
 1140ldx #(NEWIRQ DIV 256)
 1150stx irqv+1
 1160cli
 1170ldx #&00
 1180stx flag
 1190jsr SET_RECEIVE_MODE
 1200jsr CHANGE_VECTORS
 1210rts
 1220\
 1230.NEWIRQ pha
 1240lda flag1
 1250and #&10
 1260cmp #&00
 1270beq noirq
 1280txa
 1290pha
 1300tya
 1310pha
 1320lda #&00
```

```
1330sta half
1340lda port
1350and #&80
1360sta image
1370jsr SHAKE
1380jsr GTDATA
1390pla
1400tay
1410pla
1420tax
1430.noirq pla
1440jmp (oldirqv)
1450\
1460.WAIT lda port
1470and #&80
1480cmp image
1490beq WAIT
1500sta image
1510rts
1520\
1530.SET_SEND_MODE lda #&4F
1540sta ddr
1550rts
1560\
1570.SET_RECEIVE_MODE lda #&40
1580sta ddr
1590rts
1600\
1610.WBYTE tax
1620jsr WLNYB
1630jsr SHAKE
1640jsr WAIT
1650jsr WHNYB
1660jsr SHAKE
1670rts
1680\
1690.WLNYB lda port
1700and #&F0
1710sta half
1720txa
1730and #&0F
1740ora half
1750sta port
1760rts
1770\
1780.WHNYB lda port
1790and #&F0
1800sta half
1810txa
1820lsr A
1830lsr A
1840lsr A
1850lsr A
1860and #&0F
1870ora half
1880sta port
1890rts
1900\
1910.SHAKE lda port
1920eor #&40
1930sta port
1940rts
1950\
1960.TRANSMIT jsr SET_SEND_MODE
1970lda port
1980and #&80
1990sta image
2000lda #&00
2010sta half
2020rts
2030\
2040.SEND jsr TRANSMIT
2050jsr GENBBCIRQ
2060jsr WAIT
2070jsr OUTPACKET
2080jsr OUTDATA
2090jsr SET_RECEIVE_MODE
2100rts
2110\
2120.GENBBCIRQ lda pa2
2130ora #&04
2140sta pa2
2150lda pa2
2160and #&FB
2170sta pa2
2180rts
2190\
2200.LDBYTE jsr LDNYB
2210sta half
2220jsr SHAKE
2230jsr WAIT
2240jsr LDNYB
2250asl A
2260asl A
2270asl A
2280asl A
2290ora half
2300pha
2310jsr SHAKE
2320pla
2330rts
2340\
2350.LDNYB lda port
2360and #&0F
2370rts
2380\
2390.RECEIVE lda #&00
2400sta half
2410lda port
2420and #&80
2430sta image
2440jsr SHAKE
2450jsr GTDATA
2460rts
2470\
2480.OUTPACKET
2490lda data
2500jsr WBYTE
2510jsr WAIT
2520lda data+1
2530jsr WBYTE
2540jsr WAIT
2550lda len
2560jsr WBYTE
2570jsr WAIT
2580lda len+1
2590jsr WBYTE
2600jsr WAIT
2610lda cmd
2620jsr WBYTE
2630jsr WAIT
2640rts
2650\
2660.OUTDATA ldy #&00
2670lda len+1
2680beq lastwpage
2690.wloop lda (from),Y
2700jsr WBYTE
2710JSR WAIT
2720iny
2730bne wloop
2740dec len+1
2750inc from+1
2760jmp OUTDATA
2770.lastwpage lda len
2780beq endwpage
2790ldy #&00
2800.loop1 lda (from),Y
2810jsr WBYTE
2820JSR WAIT
2830iny
2840cpy len
2850bne loop1
2860.endwpage rts
2870rts
2880\
2890.GTDATA
2900jsr WAIT
2910jsr LDBYTE
2920sta data
2930jsr WAIT
2940jsr LDBYTE
2950sta data+1
2960jsr WAIT
2970jsr LDBYTE
2980sta len
2990jsr WAIT
3000jsr LDBYTE
3010sta len+1
3020jsr WAIT
3030jsr LDBYTE
3040sta cmd
3050jsr CHKCMD
3060\
3070.dataloop ldy #&00
3080lda len+1
3090beq lastrpage
3100.rloop jsr WAIT
3110jsr LDBYTE
3120sta (data),Y
3130iny
3140bne rloop
3150dec len+1
3160inc data+1
3170jmp dataloop
3180.lastrpage lda len
3190beq endrpage
3200ldy #&00
3210.loop2 jsr WAIT
3220jsr LDBYTE
3230sta (data),Y
3240iny
3250cpy len
3260bne loop2
3270.endrpage rts
3280\
3290.CHANGE_VECTORS lda #BLODE
MOD 256
3300sta loadv
3310lda #BLODE DIV 256
3320sta loadv+1
3330lda #BSAV MOD 256
3340sta savev
3350lda #BSAV DIV 256
3360sta savev+1
3370rts
3380\
3390.BSAV lda device
3400cmp #&08
3410beq dsave
3420jmp CSAV
3430.dsave ldy flen
3440bne good_name
3450jmp BAD_NAME
3460.good_name lda sa
3470sta header
3480jsr SAV_MSG
3490ldy #&30
3500sty header+1
3510ldy #&00
3520lda (name),Y
3530cmp #ASC("4")
3540bcs out_range
3550cmp #ASC("0")
3560bcc out_range
3570sta header+1
3580iny
3590lda (name),Y
3600cmp #ASC(":")
3610beq strip_name
3620jmp BAD_NAME
3630.strip_name jsr inc_name
3640jsr inc_name
3650dec flen
3660dec flen
3670.out_range ldy #&00
3680.nloop lda (name),Y
3690sta header+2,Y
3700iny
3710cpy flen
3720bne nloop
3730lda #&0D
3740sta header+2,Y
3750ldx sadd
3760stx header+19
3770ldx sadd+1
3780stx header+20
3790ldx eadd
3800stx header+21
3810ldx eadd+1
3820stx header+22
3830\
3840ldx #&01
```

```
3850stx cmd
3860ldx #header MOD 256
3870stx from
3880ldx #header DIV 256
3890stx from+1
3900sec \ Gen len from eadd and
sadd
3910lda eadd
3920sbc sadd
3930sta len
3940lda eadd+1
3950sbc sadd+1
3960sta len+1
3970inc len+1 \ Include header
3980\
3990jsr TRANSMIT
4000jsr GENBBCIRQ
4010jsr WAIT
4020jsr OUTPACKET
4030lda len
4040pha
4050lda len+1
4060pha
4070lda #&00
4080sta len
4090lda #&01
4100sta len+1
4110jsr OUTDATA
4120\
4130lda sadd
4140sta from
4150lda sadd+1
4160sta from+1
4170pla
4180sta len+1
4190dec len+1
4200pla
4210sta len
4220jsr OUTDATA
4230jsr SET_RECEIVE_MODE
4240\
4250clc
4260rts
4270\
4280.inc_name ldx name
4290inx
4300stx name
4310bne end_inc_name
4320ldx name+1
4330inx
4340stx name+1
4350.end_inc_name rts
4360\
4370.BLODE ldx device
4380cpx #&08
4390beq dload
4400jmp CLODE
4410.dload sta lv
4420cmp #&00
4430beq not_ver
4440jmp NO_FILE
4450.not_ver ldy flen
4460bne good_lname
4470jmp BAD_NAME
4480.good_lname lda sa
4490sta header
4500jsr LD_MSG
4510ldy #&30
4520sty header+1
4530ldy #&00
4540lda (name),Y
4550cmp #ASC("4")
4560bcs out_lrange
4570cmp #ASC("0")
4580bcc out_lrange
4590sta header+1
4600iny
4610lda (name),Y
4620cmp #ASC(":")
4630beq strip_lname
4640jmp BAD_NAME
4650.strip_lname jsr inc_name
4660jsr inc_name
4670dec flen
4680dec flen
4690.out_lrange ldy #&00
4700.nloop2 lda (name),Y
4710sta header+2,Y
4720iny
4730cpy flen
4740bne nloop2
4750lda #&0D
4760sta header+2,Y
4770ldx sa
4780beq basic
4790ldx #&00
4800stx header+19
4810stx header+20
4820jmp send_header
4830.basic ldx bstart
4840stx header+19
4850ldx bstart+1
4860stx header+20
4870.send_header ldx #&00
4880stx header+21
4890stx header+22
4900\
4910ldx #&02
4920stx cmd
4930ldx #header MOD 256
4940stx from
4950ldx #header DIV 256
4960stx from+1
4970ldx #&00
4980stx len
4990ldx #&01
5000stx len+1
5010jsr SEND
5020\
5030.lloop ldx cmd
5040cpx #&03
5050bne lloop
5060ldx #&00
5070stx cmd
5080ldx header+21
5090stx eadd
5100ldy header+22
5110sty eadd+1
5120clc
5130rts
5140\
5150.CHKCMD ldx cmd
5160beq not_disk
5170jmp disk
5180.not_disk rts
5190\
5200.disk lda len
5210pha
5220ldx len+1
5230dex
5240txa
5250pha
5260ldx #&00
5270stx len
5280ldx #&01
5290stx len+1
5300ldx #header MOD 256
5310stx data
5320ldx #header DIV 256
5330stx data+1
5340jsr dataloop
5350ldx header+19
5360stx data
5370ldx header+20
5380stx data+1
5390ldx header
5400bne mc
5410ldx bstart
5420stx data
5430ldx bstart+1
5440stx data+1
5450.mc pla
5460sta len+1
5470pla
5480sta len
5490rts
5500]
5510NEXT PASS
5520CALL TRANSFER
5530CALL RESET
5540:
5550HIMEM=HIMEM-&0400:CODE=HIME
M
5560irq2v=&206:oldv=&F8:from=&8
0:data=&82:port=&FE60
5570ddr=port+2:pcr=port+12:ifr=
port+13:ier=port+14
5580cmd=&84:len=&85:flag=&87:ha
lf=&88:image=&89:buffer=&90
5590OSBYTE=&FFF4:OSFILE=&FFDD:O
SLI=&FFF7
5600FOR PASS=0 TO 2 STEP 2
5610P%=CODE
5620[OPT PASS
5630.SETUP sei
5640lda irq2v
5650sta oldv
5660lda irq2v+1
5670sta oldv+1
5680.RESETUP sei
5690lda #(newv MOD 256)
5700sta irq2v
5710lda #(newv DIV 256)
5720sta irq2v+1
5730lda #128+16
5740sta ier
5750cli
5760jsr SET_RECEIVE_MODE
5770rts
5780\
5790.newv lda ifr
5800and #128+16
5810cmp #&00
5820beq finirq
5830sta ifr
5840jsr RECEIVE
5850.finirq jmp (oldv)
5860\
5870.WAIT lda port
5880and #&40
5890cmp image
5900beq WAIT
5910sta image
5920rts
5930\
5940.SET_SEND_MODE lda #&8F
5950sta ddr
5960rts
5970\
5980.SET_RECEIVE_MODE lda #&80
5990sta ddr
6000rts
6010\
6020.WBYTE tax
6030jsr WLNYB
6040jsr SHAKE
6050jsr WAIT
6060jsr WHNYB
6070jsr SHAKE
6080rts
6090\
6100.WLNYB lda port
6110and #&F0
6120sta half
6130txa
6140and #&0F
6150ora half
6160sta port
6170rts
6180\
6190.WHNYB lda port
6200and #&F0
6210sta half
6220txa
6230lsr A
6240lsr A
6250lsr A
6260lsr A
6270and #&0F
6280ora half
6290sta port
6300rts
```

```
6310\
6320.SHAKE lda port
6330eor #&80
6340sta port
6350rts
6360\
6370.OUTPACKET
6380lda data
6390jsr WBYTE
6400jsr WAIT
6410lda data+1
6420jsr WBYTE
6430jsr WAIT
6440lda len
6450jsr WBYTE
6460jsr WAIT
6470lda len+1
6480jsr WBYTE
6490jsr WAIT
6500lda cmd
6510jsr WBYTE
6520jsr WAIT
6530rts
6540\
6550.OUTDATA ldy #&00
6560lda len+1
6570beq lastwpage
6580.wloop lda (from),Y
6590jsr WBYTE
6600JSR WAIT
6610iny
6620bne wloop
6630dec len+1
6640inc from+1
6650jmp OUTDATA
6660.lastwpage lda len
6670beq endwpage
6680ldy #&00
6690.loop1 lda (from),Y
6700jsr WBYTE
6710JSR WAIT
6720iny
6730cpy len
6740bne loop1
6750.endwpage rts
6760rts
6770\
6780.TRANSMIT jsr SET_SEND_MODE
6790lda port
6800and #&40
6810sta image
6820lda #&00
6830sta half
6840rts
6850\
6860.SEND jsr TRANSMIT
6870jsr GEN64IRQ
6880jsr WAIT
6890jsr OUTPACKET
6900jsr OUTDATA
6910jsr SET_RECEIVE_MODE
6920rts
6930\
6940.GEN64IRQ lda #128+64
6950sta pcr
6960lda #128+64+32
6970sta pcr
6980rts
6990\
7000.LDBYTE jsr LDNYB
7010sta half
7020jsr SHAKE
7030jsr WAIT
7040jsr LDNYB
7050asl A
7060asl A
7070asl A
7080asl A
7090ora half
7100pha
7110jsr SHAKE
7120pla
7130rts
7140\
7150.LDNYB lda port
7160and #&0F
7170rts
7180\
7190.GTDATA
7200jsr WAIT
7210jsr LDBYTE
7220sta data
7230jsr WAIT
7240jsr LDBYTE
7250sta data+1
7260jsr WAIT
7270jsr LDBYTE
7280sta len
7290jsr WAIT
7300jsr LDBYTE
7310sta len+1
7320jsr WAIT
7330jsr LDBYTE
7340sta cmd
7350jsr CHKCMD
7360\
7370lda len
7380pha
7390lda len+1
7400pha
7410.dataloop ldy #&00
7420lda len+1
7430beq lastrpage
7440.rloop jsr WAIT
7450jsr LDBYTE
7460sta (data),Y
7470iny
7480bne rloop
7490dec len+1
7500inc data+1
7510jmp dataloop
7520.lastrpage lda len
7530beq endrpage
7540ldy #&00
7550.loop2 jsr WAIT
7560jsr LDBYTE
7570sta (data),Y
7580iny
7590cpy len
7600bne loop2
7610.endrpage pla
7620sta len+1
7630pla
7640sta len
7650rts
7660\
7670.RECEIVE lda #&00
7680sta half
7690lda port
7700and #&40
7710sta image
7720jsr SHAKE
7730jsr GTDATA
7740rts
7750\
7760.CHKCMD ldx cmd
7770beq ok
7780ldx buffer
7790stx data
7800ldx buffer+1
7810stx data+1
7820.ok rts
7830\
7840.DSETUP lda #&83
7850jsr OSBYTE
7860stx buffer
7870sty buffer+1
7880.new_file ldx #&00
7890stx cmd
7900.dloop ldx cmd
7910beq dloop
7920cpx #&01
7930bne not_dsave
7940jsr DSAVE
7950.not_dsave cpx #&02
7960bne not_dload
7970jsr DLOAD
7980.not_dload jmp new_file
7990\
8000.DSAVE ldx buffer
8010stx fcb+&0A
8020ldx buffer+1
8030stx fcb+&0B
8040sec
8050lda buffer
8060adc len
8070sta fcb+&0E
8080lda buffer+1
8090adc len+1
8100sta fcb+&0F
8110clc
8120lda buffer
8130adc #&02
8140sta fcb
8150lda buffer+1
8160adc #&00
8170sta fcb+&01
8180ldx #fcb MOD 256
8190ldy #fcb DIV 256
8200lda #&00
8210jsr OSFILE
8220rts
8230\
8240.fcb EQUD &0000 \ Filename
8250EQUD &0000 \ Load Address
8260EQUD &0000 \ Execution Addr
ess
8270EQUD &0000 \ Start Address
8280EQUD &0000 \ End Address
8290\
8300.DLOAD clc
8310lda buffer
8320adc #&02
8330sta fcb
8340lda buffer+1
8350adc #&00
8360sta fcb+&01
8370ldy #19
8380lda (buffer),Y
8390sta data
8400iny
8410lda (buffer),Y
8420sta data+1
8430lda buffer
8440sta fcb+&02
8450lda buffer+1
8460sta fcb+&03
8470ldx #&00
8480stx fcb+&06
8490ldy #fcb DIV 256
8500ldx #fcb MOD 256
8510lda #&FF
8520jsr OSFILE
8530\
8540ldx buffer
8550stx from
8560ldx buffer+1
8570stx from+1
8580ldx fcb+&0A
8590stx len
8600ldx fcb+&0B
8610stx len+1
8620ldx #&03
8630stx cmd
8640jsr SEND
8650rts
8660\
8670.DRIVE_NUM ldy #&01
8680lda (buffer),Y
8690sta drive
8700ldx #osl MOD 256
8710ldy #osl DIV 256
8720jsr OSLI
8730rts
8740\
8750.osl EQUS "DRIVE "
8760.drive EQUB &00
8770EQUB &0D
8780\
8790]
8800NEXT PASS
8810CALL SETUP
8820CALL DSETUP
```

OFFICIAL COMMODORE/AMIGA DEALER

COMPUTERS	
Amiga 2000 1Mb + 1081 Colour Mon	1604.25
Amiga 500 512K + 1081 Colour Mon	691.00
Amiga 500 512K + Dpaint + Modulator	£461.00
Commodore 128D Desktop (NEW)	£379.00
Commodore 128 + 10 Tapes or Disks	229.00
PRINTERS	
Citizen 120D Dot Matrix 120cps & NLQ	195.00
Commodore MPS1200 120cps & NLQ	249.00
Commodore DPS1101 Daisywheel	179.00
Star NL10 for C64/128 120cps & NLQ	219.00
Okimate 20 Colour for Amiga	199.00
MONITORS	
Commodore 1901 Col Mon inc lead	299.00
Commodore 1081 Colour Monitor	291.00
Philips 8833 Col Mon inc lead	299.00
Philips BM7502 Green Mon inc lead	82.80
MISCELLANEOUS	
Commodore 1541C Disk Drive	182.85
Commodore 1571 Disk Drive	239.00
Cumana CAX354 Amiga Disk Drive	135.00
Commodore C2N Data Recorder	35.00
Cent Interface for C64/128	29.95
Super-G Cent Interf + Graphics	34.95
RS232 Interface with disk software	57.44
User port printer cable	15.99
Commodore 64 Power Supply	26.45
Amiga Modulator	24.00
Surge Protector 13 Amp Plug (Adapter £14.95)	11.95
Amiga DOS Ref Manual (p&p £2)	18.95
C128 Official Prog's Ref Guide (p&p £2)	18.95
C64 Official Prog's Ref Guide (p&p £2)	7.95
SOFTWARE (EXAMPLES)	
Amiga VIP Professional	129.00
Amiga Scribble 2	79.00
Amiga Superbase	86.95
GEOS for C64 — geoPaint geoWrite etc.	49.00
GEOS Fontpack 1 with 20 Fonts	21.99
GEOS Deskpack	23.99
GEOS Writer's Workshop/GEOCALC/GEOFILE each:	34.99
Superbase 128 Programable Database	55.95
Superscript 128 Word Processor	45.95
Tasword 64 40/80 Col WP — Tape/Disk	17.95/19.95
VizaWrite Classic 128 WP + Spell Check	79.35

ALL PRICES INC. VAT. CARRIAGE £8, EXPRESS DELIVERY £12
Software & Small items FREE

Delta Pi Software Ltd

8 Ruswarp Lane, WHITBY, N. Yorks. YO2 1ND.
Tel: 0947 600065 (9am-7pm)

NEW!

INFO MAT for AMIGA

BitStream

FEATURES
- All AmigaDos 1.2 Commands in easy reference format.
- Understand what those dreaded "Gurus" mean.
- Ideal for use as a MOUSE MAT.
- Virtually indestructable high grade plastic.
- Size 11" by 14"
- Only £4.95 (inc p&p)★

(Available soon. MSDOS and Atari ST versions)

COMMODORE 128 COMPANION

by Tim Arnot

- More about BASIC 7.0 than you knew existed
- Kernal, Editor & Basic jump tables revealed!
- Complete memory maps for 128 and 64 modes
- Detailed hardware descriptions
- Lies flat when open!
- 340 pages
- Only £9.95 (inc p&p) ★

ISBN 1 870381 00 9

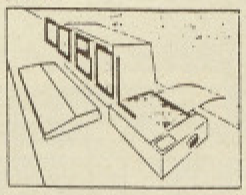
Available from:

BitStream Publishing (Dept. Y4)
26-28 OSBORNE ROAD,
SOUTHSEA, HANTS. PO5 3LT.

★ *Add £1.00 for overseas orders.*

ABACUS SOFTWARE PRODUCTS
from ADAMSOFT

COBOL
for the C-64 and C-128

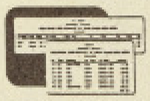


Now learn this universal business language on your Commodore 64 or Commodore 128!

COBOL is the most widespread business programming language in use today. Now you can run this easy-to-us. English-like language on your C-64 with the easy-to-learn COBOL System package. The COBOL System features a syntax-checking editor, interpreter, compiler, and a number of symbolic debugging aids; a crunch function to reduce the memory size of your programs; a print on/print off feature, and much more. Includes sample programs to help you learn as you go, as well as a complete 150-page manual.

Both versions on 1 disk **£34.95**

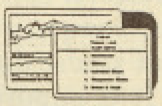
PPM Personal Portfolio Manager
for C-64 or C-128



PPM is the most comprehensive portfolio management system available for the C-64 and C-128. Recommended for independent or professional investors, PPM lets you customize your reports according to your needs. PPM lets you manage stocks, bonds, mutual funds, treasury bills; record taxable or non-taxable dividends and interest income; reconcile each brokerage account cash balance with the Year-To-Date transaction file. The unique report generator produces any type of report needed to view or analyze a portfolio or security.

For C-64 **£34.95**
For C-128 **£44.95**

TAS Technical Analysis System
for C-64 or C-128



Our Technical Analysis System Package in for the serious stock market investor. TAS analyzes and charts technical indicators to help the investor determine when to buy and sell securities. Our new enhanced version is up to 3-4 times faster than the original. Track high, low, close, volume, bid and ask by date. Place 300 periods of information for up to 10 different issues on a data diskette; formatting more data diskettes possible for larger portfolios. Build a variety of chart types on the split screen: 7 moving averages, 3 oscillators, 5 volume indicators, comparison charts for 2 different issues, trading bands, and least squares. The new C-128 version incorporates powerful new features such as macros, and quick-draw charts using up to four windows. Uses 1 or 2 disk drives. Hardcopy to most dot matrix printers.

For C-64 **£34.95**
For C-128 **£44.95**

DEDUCT 10% if you purchase 2 or more Abacus Software products.

All software products are on disk.

Free postage on U.K. and overseas orders. We stock the entire range of Abacus Software products and books. Send SAE for catalogue. Generous dealer terms available. Access (not Visa) or transcash orders accepted (a/c 687944007). Add £1.50 COD. Callers by appointment.

ADAMSOFT (Dept YC) 18 Norwich Avenue, Rochdale, Lancs 0L11 5JZ. Tel: 0706-524304.

TELETEXT

A world of information at your fingertips

A Microtext Adaptor turns your C64 or 128 into a sophisticated Teletext receiver giving you access to the very latest information at the touch of a button. Amongst its features are:-

★ 24 × 40 full colour text and graphics display.

★ Teletext pages may be saved to disc or cassette.

★ Print out page to any printer on the serial bus.

★ Teletext may be accessed and used by your own programs.

★ Easy to use single key functions for "Next page", "Reveal" etc.

The Teletext services from Ceefax or Oracle are free, there's the latest world news and software reviews, sports or financial results, there's recipies, whats on TV and much much more, hundreds of pages, constantly updated - A world of information at your fingertips. Supplied with a manual and a lead, the Microtext Adaptor fits neatly on the user port. The lead connects to the "VIDEO OUT" socket of a video recorder.

Just £69.95 inc. P&P (Overseas add £2.00).

'I wouldn't hesitate to recommend this to anyone'.
— Your Commodore Jun 1987

MICROTEXT TUNER NOW AVAILABLE

Our own Tuner has been specially designed to provide the signal that the Adaptor needs, thus eliminating the need for a video recorder. Just plug in the aerial, it tunes itself in (!) and channels are selected from the keyboard. The whole system consists of a Microtext Adaptor, Tuner, Power supply, lead and manual and costs just **£114.80 inc P&P** (128D owners add £8.50 for user port extension lead).

Only from:-

MICROTEXT

Dept YC, 7 Birdlip Close, Horndean, Hants. PO8 9PW
Telephone: 0705 595694

Rebound

A superb breakout style game for C16 and Plus/4 owners.

By K.M. Lawrence

It's funny how the old favourites like space invaders and breakout are still extremely popular with computer owners.

To play the game LOAD the program "REBOUND" and RUN it. This will automatically LOAD and RUN the machine code section of the program.

Use a joystick in port one to move your bat and hold down the fire button to make the bat move faster. But be careful – you have limited power to do this.

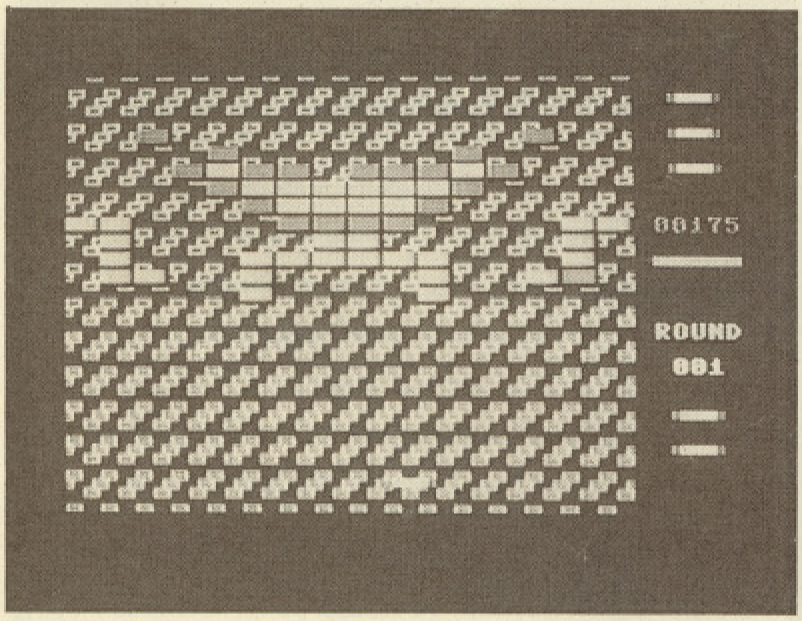
When you hit a brick it may turn into a 'mutant' and flash. From this state the brick may return to normal or it may change into a brick that will affect your bat in strange ways. The possibilities are: small bat, reverse controls or fast ball. The latter lasts until you hit the ball again while the others last for a certain length of time.

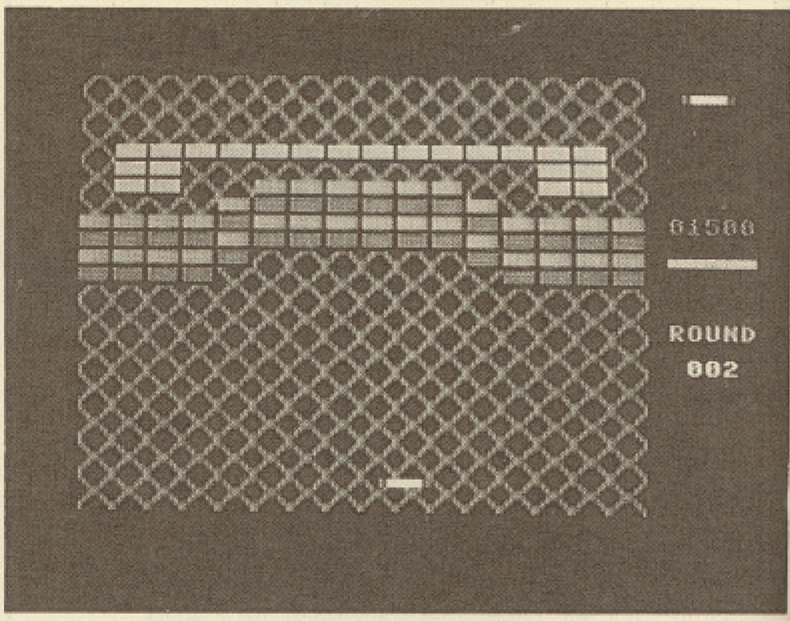
It is possible that when you hit a brick, a white dot may fall towards you. If you catch this you get the chance of using one of the various options that will appear on the right of the screen. Pull the joystick down to choose the option that you want, but remember, the more dots that you collect the better the option that is given to you.

Options Available

Power – Extra power to go fast.
Cure – Gets rid of small bat etc.
Exit – Go to next level.
XBALL– Up to three balls on screen, push up to release.
XLIFE – Up to 255.
Wall – Places a wall behind you so that balls will not be lost.

When the game starts the screens are set to random order. Press RETURN while on the title screen to play the screens in sequence.





Getting it all in

Rebound consists of two programmes. The first, REBOUND, is in Basic and should be typed into your machine in the normal way and then SAVEd to disk or cassette.

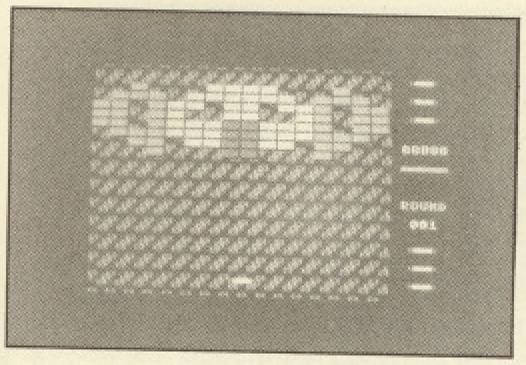
The second program, REBOUND M/C, needs to be entered through the computers in built monitor. To enter the monitor type MONITOR, type M 1000 to start entering the program. You will now be able to enter each line of the listing over the existing contents of the computer. You must press RETURN to enter each line of machine code. If you have never used the MONITOR, read the relevent section in your computer's manual and be sure that you understand what you're doing before entering the program.

It is important to note that your typing must be very accurate. The slightest typing error will cause the program not to work.

When you have entered all of the REBOUND M/C program you should SAVE it to disk or tape by using the following command:

S "REBOUND M/C",01,1000,3400.

If using disk change the 01 to 08. Cassette users should SAVE REBOUND M/C after the program.



MONITOR

```
   PC  SR AC XR YR SP
; FFFF 00 FF FF FF F8

>1000 20 5B 22 A9 26 8D E6 10
>1008 A9 28 8D E7 10 A9 00 8D
>1010 1C 1B A9 00 8D 15 FF 8D
>1018 19 FF A9 93 20 D2 FF A9
>1020 C0 8D 12 FF A9 30 8D 13
>1028 FF AD 07 FF 09 10 8D 07
>1030 FF A9 51 8D 16 FF 20 D2
>1038 11 20 70 23 A9 93 20 D2
>1040 FF AD 25 28 29 01 8D 25
>1048 28 20 91 12 20 51 13 20
>1050 E3 21 20 EE 21 20 D1 10
>1058 20 B7 1D 20 27 12 20 44
>1060 14 20 44 13 EE 5F 1D EE
>1068 65 1D 20 C9 14 A9 00 8D
>1070 63 1F 20 44 13 A9 00 8D
>1078 15 FF 20 DC 1F 20 BD 14
>1080 20 F0 19 20 1F 15 AD 1E
>1088 15 F0 3D 20 3E 21 20 F3
>1090 1F 20 CD 1D 20 09 1D 20
>1098 D6 1B 20 3A 22 20 97 27
>10A0 20 A6 27 AD 07 1B F0 23
>10A8 A9 FE 20 70 DB 29 10 D0
>10B0 C1 AD E6 10 18 69 20 8D
>10B8 E6 10 EE 1C 1B AD E7 10
>10C0 69 00 8D E7 10 4C 12 10
>10C8 4C 31 1E 4C BD 1E 4C DD
>10D0 24 A9 0C 85 2C A9 00 85
>10D8 2B 8D 07 1B AD 25 28 D0
>10E0 ED A2 00 A0 00 BD 26 28
>10E8 85 31 86 2F A2 07 BD 66
>10F0 11 CA 1D 66 11 E8 25 31
>10F8 F0 29 85 32 EE 07 1B A9
>1100 3A 91 2B C8 A9 3B 91 2B
>1108 20 5A 11 A5 32 86 32 E0
>1110 01 F0 05 4A CA 4C 0F 11
>1118 AA BD 6E 11 A6 32 91 2D
>1120 88 91 2D C8 C8 CA CA C0
>1128 08 D0 C3 A5 2B 18 69 08
>1130 85 2B A5 2C 69 00 85 2C
>1138 A6 2F A0 00 E8 8A 29 01
>1140 D0 A3 A5 2B 18 69 18 85
>1148 2B A5 2C 69 00 85 2C E0
>1150 20 D0 90 0E 07 1B 4C 72
>1158 11 00 A5 2B 85 2D A5 2C
>1160 38 E9 04 85 2E 60 01 02
>1168 04 08 10 20 40 80 00 3A
>1170 3E 6F A9 0C 85 2C A9 0F
>1178 85 2F A9 00 85 2B A0 0F
>1180 B1 2B AA 20 5A 11 B1 2D
>1188 85 32 84 31 E0 20 F0 1E
>1190 98 49 FF 29 0F 18 69 10
>1198 A8 8A C9 20 30 10 49 FF
>11A0 29 01 18 69 3A 91 2B 20
>11A8 5A 11 A5 32 91 2D A4 31
>11B0 88 10 CD A5 2B 18 69 28
>11B8 85 2B A5 2C 69 00 85 2C
>11C0 C6 2F 10 BA AD 1C 1B 4A
>11C8 4A 4A 4A 18 69 01 8D 1D
>11D0 1B 60 78 A9 02 8D 0A FF
>11D8 A9 EE 8D 14 03 A9 11 8D
>11E0 15 03 A9 00 8D 09 FF A9
>11E8 32 8D 0B FF 58 60 AD 09
>11F0 FF 29 02 F0 20 20 AB 13
>11F8 A9 01 8D 59 11 EE 1B 1B
>1200 20 76 22 A9 D0 8D 0B FF
>1208 AD 0A FF 29 FE 8D 0A FF
>1210 A9 02 8D 09 FF 4C BE FC
>1218 50 51 00 00 52 53 54 00
>1220 55 51 56 00 57 51 58 A6
>1228 34 A5 35 85 30 C9 03 F0
>1230 18 A9 59 85 32 A5 32 9D
>1238 98 0F C8 E8 E6 32 C6 30
>1240 30 06 D0 F1 A5 33 D0 ED
>1248 60 A9 59 9D 98 0F E8 C6
>1250 30 A9 5C 9D 98 0F A9 59
>1258 85 32 D0 DE A6 34 A5 35
>1260 85 30 A5 33 0A 0A A8 8A
>1268 49 FF 29 01 18 69 1D 9D
>1270 98 0F E8 C8 C6 30 30 06
>1278 D0 ED A5 33 D0 E9 A5 37
>1280 C5 35 F0 0C A5 37 85 35
>1288 A5 34 C9 1E D0 02 C6 34
>1290 60 20 88 1D 20 E8 1D 20
>1298 64 1F A9 0F 85 34 A9 00
>12A0 85 33 A9 FF 8D CA 12 A9
>12A8 03 85 35 85 37 A9 01 85
>12B0 36 A9 55 8D 04 14 A9 00
>12B8 85 3A 8D C8 12 85 38 85
>12C0 39 8D A3 1F 20 12 1C 60
>12C8 00 00 00 20 33 1D A9 FB
>12D0 20 70 DB 85 3B 29 04 F0
>12D8 1F A5 3B 29 08 F0 51 60
>12E0 A5 33 D0 04 A5 34 F0 F7
>12E8 A5 33 38 E9 01 29 03 85
>12F0 33 C9 03 D0 02 C6 34 60
>12F8 A5 36 18 6D 32 1D 85 32
>1300 A5 3A D0 38 20 E0 12 C6
>1308 32 10 F9 60 A5 33 D0 12
>1310 A5 34 C9 1E F0 C9 A5 35
>1318 C9 02 F0 06 A5 34 C9 1D
>1320 F0 BD A5 33 18 69 01 29
>1328 03 85 33 D0 CA E6 34 60
>1330 A5 36 18 6D 32 1D 85 32
>1338 A5 3A D0 C8 20 0C 13 C6
>1340 32 10 F9 60 A9 00 8D 59
>1348 11 E6 3C AD 59 11 F0 FB
>1350 60 20 66 1D A9 0C 85 2C
>1358 A9 00 85 2B A2 0D A9 1B
>1360 8D AA 13 A9 02 85 2F A0
>1368 00 A9 01 18 6D AA 13 91
>1370 2B 20 5A 11 A9 3A 91 2D
>1378 98 29 01 18 6D AA 13 C8
>1380 C0 20 D0 EB A5 2B 18 69
>1388 50 85 2B A5 2C 69 00 85
>1390 2C CA D0 D3 A2 0C A9 1D
>1398 8D AA 13 A9 0C 85 2C A9
>13A0 28 85 2B C6 2F D0 C0 4C
>13A8 8B 1F 00 AD DF 30 8D F9
>13B0 13 AD E7 30 8D FA 13 AD
>13B8 EF 30 8D FB 13 AD F7 30
>13C0 8D FC 13 A2 06 BD D8 30
>13C8 9D D9 30 BD E0 30 9D E1
>13D0 30 BD E8 30 9D E9 30 BD
>13D8 F0 30 9D F1 30 CA 10 E5
>13E0 AD F9 13 8D E8 30 AD FA
>13E8 13 8D F0 30 AD FB 13 8D
>13F0 D8 30 AD FC 13 8D E0 30
>13F8 60 00 00 00 00 F5 3D 0F
>1400 03 5F 57 55 D5 00 C0 F0
>1408 7C 55 55 55 D5 00 C0 F0
>1410 FC 00 00 00 00 FF 3F 0F
>1418 03 00 00 00 00 A5 30 18
>1420 69 01 49 FF 29 01 0A 0A
>1428 0A A8 A9 07 85 32 B9 E8
>1430 30 9D E0 32 C8 E8 C6 32
>1438 10 F4 A2 00 F0 14 C6 2F
>1440 E6 30 D0 0E A5 34 85 30
>1448 A2 00 A5 35 85 2F C9 03
>1450 F0 CB A5 30 49 FF 29 01
>1458 0A 0A 0A A8 A9 07 85 32
>1460 B9 E8 30 9D C8 32 C8 E8
>1468 C6 32 10 F4 E6 30 C6 2F
>1470 A5 2F C9 02 F0 C8 C9 00
>1478 10 D8 A9 03 85 32 A2 00
>1480 A0 00 84 30 8A 18 65 33
>1488 AA 98 18 69 03 A8 B9 C8
>1490 32 3D 0D 14 1D FD 13 99
>1498 C8 32 88 C4 30 10 EF 8A
>14A0 18 69 04 AA 98 18 69 09
>14A8 A8 84 30 C6 32 10 DA 60
>14B0 A2 00 A0 00 C8 D0 FD E8
>14B8 E0 14 D0 F8 60 20 5C 12
>14C0 20 CB 12 20 44 14 4C 27
>14C8 12 A9 00 8D 1E 15 20 44
>14D0 13 20 BD 14 20 CD 1D A5
>14D8 3B 29 40 D0 F1 A9 00 8D
>14E0 65 1D 8D 5A 22 4C BC 1C
>14E8 00 00 00 00 00 00 00 00
>14F0 00 00 00 00 00 00 00 00
>14F8 00 00 00 00 00 00 00 00
>1500 00 00 00 00 00 00 00 00
>1508 00 00 00 00 00 00 00 00
>1510 00 00 00 00 00 00 00 00
>1518 00 00 00 00 01 FF 00 A2
>1520 03 86 2F BD 18 15 F0 4F
>1528 BD F0 14 85 30 BD F8 14
>1530 85 31 BD EC 14 A8 85 3D
>1538 BD E8 14 AA 20 B6 16 A5
>1540 2F 0A 0A AA A9 01 85 32
>1548 A0 00 BD 04 15 C9 3A 10
>1550 02 91 2B C8 E8 C0 02 F0
>1558 07 A5 30 C9 03 F0 EB E8
>1560 A5 2B 18 69 28 85 2B A5
>1568 2C 69 00 85 2C C6 32 30
>1570 06 A5 31 C9 03 F0 D1 A6
>1578 2F CA 10 A5 4C 82 15 4C
>1580 9C 16 20 27 12 A2 00 BD
>1588 18 15 F0 F3 BD F0 14 85
>1590 30 BD F8 14 85 31 86 2F
>1598 20 F5 16 A6 2F BD 18 15
>15A0 F0 DD BD F0 14 85 30 BD
>15A8 F8 14 85 31 A6 2F BD EC
>15B0 14 A8 BD E8 14 AA A5 2F
>15B8 0A 0A 0A 0A 0A 8D A2 16
>15C0 20 B6 16 A5 2F 0A 0A AA
>15C8 A9 02 85 3E A0 00 84 3D
>15D0 B1 2B 9D 04 15 8A 18 69
>15D8 5D 91 2B BD 04 15 C9 59
>15E0 30 03 4C CF 19 0A 0A 0A
>15E8 A8 8A 85 3F 0A 0A 0A AA
>15F0 A9 07 85 32 B9 00 30 9D
>15F8 E8 32 E8 C8 C6 32 10 F4
>1600 A6 3F E8 A4 3D C8 C0 02
>1608 F0 07 A5 30 C9 03 F0 BE
>1610 E8 A5 2B 18 69 28 85 2B
>1618 A5 2C 69 00 85 2C C6 3E
>1620 A5 3E F0 06 A5 31 C9 03
>1628 F0 A2 A5 31 0A A8 84 3D
>1630 A9 02 85 31 A9 E8 85 2B
>1638 A9 32 85 2C A5 2F 0A 0A
>1640 0A 0A 0A 8D A2 16 18 65
>1648 2B 85 2B A5 2C 69 00 85
>1650 2C A6 30 A9 03 85 32 B1
>1658 2B 3D A3 16 1D AB 16 91
>1660 2B C8 C0 08 30 0F A5 2B
>1668 18 69 10 85 2B A5 2C 69
>1670 00 85 2C A0 00 C6 32 10
>1678 DE A9 F0 85 2B A9 32 85
>1680 2C A5 2B 18 6D A2 16 85
>1688 2B A5 2C 69 00 85 2C A4
>1690 3D 8A 18 69 04 AA C6 31
>1698 D0 B9 A6 2F E8 E0 04 D0
>16A0 12 60 00 0F C3 F0 FC FF
>16A8 FF FF 3F 50 14 05 01 00
>16B0 00 00 40 4C 87 15 A9 00
```

```
>16B8 8D F2 16 8D F4 16 8C F1
>16C0 16 8C F3 16 A0 05 0E F1
>16C8 16 2E F2 16 88 D0 F7 A0
>16D0 03 0E F3 16 2E F4 16 88
>16D8 D0 F7 8A 18 6D F3 16 18
>16E0 6D F1 16 85 2B AD F4 16
>16E8 6D F2 16 18 69 0C 85 2C
>16F0 60 00 00 00 00 A9 FF 85
>16F8 32 A6 2F BD EC 14 8D C5
>1700 18 BD F8 14 8D C3 18 BD
>1708 FC 14 85 30 BD E8 14 8D
>1710 C4 18 BD F0 14 8D C2 18
>1718 A6 2F BD 14 15 F0 2B 8D
>1720 7D 1A 30 3A A6 2F BD F0
>1728 14 C9 02 D0 07 BD E8 14
>1730 C9 1F F0 19 BD F0 14 18
>1738 69 01 29 03 8D C2 18 D0
>1740 09 BD E8 14 18 69 01 8D
>1748 C4 18 4C 85 17 BD 14 15
>1750 49 FF 18 69 01 9D 14 15
>1758 20 CE 22 4C 85 17 A6 2F
>1760 BD F0 14 C9 00 D0 05 BD
>1768 E8 14 F0 E1 BD F0 14 38
>1770 E9 01 29 03 8D C2 18 C9
>1778 03 D0 09 BD E8 14 38 E9
>1780 01 8D C4 18 EA 20 32 18
>1788 C6 30 10 4A A6 2F BD 00
>1790 15 85 30 A6 2F BD F4 14
>1798 F0 28 30 3D A6 2F BD F8
>17A0 14 C9 02 D0 07 BD EC 14
>17A8 C9 18 F0 59 BD F8 14 18
>17B0 69 01 29 03 8D C3 18 D0
>17B8 09 BD EC 14 18 69 01 8D
>17C0 C5 18 4C FD 17 BD F4 14
>17C8 49 FF 18 69 01 9D F4 14
>17D0 20 CE 22 4C FD 17 4C 18
>17D8 17 A6 2F BD F8 14 D0 05
>17E0 BD EC 14 F0 E0 BD F8 14
>17E8 38 E9 01 29 03 8D C3 18
>17F0 C9 03 D0 CE BD EC 14 38
>17F8 E9 01 8D C5 18 20 32 18
>1800 C6 30 10 8F 60 CE 1E 15
>1808 A9 00 9D 18 15 60 A9 1F
>1810 91 2B 20 5A 11 A9 79 91
>1818 2D CE 07 1B 20 B3 22 4C
>1820 E0 18 C8 EE 07 1B 20 B3
>1828 22 20 D0 18 A9 FF 9D F4
>1830 14 60 A9 00 8D 27 1A AD
>1838 C4 18 AA AD C5 18 A8 20
>1840 B6 16 E6 32 A2 02 B1 2B
>1848 C9 3A F0 7D C9 3B F0 7A
>1850 C9 00 F0 BA C9 1A F0 C4
>1858 C9 25 30 0E F0 C4 C9 26
>1860 F0 C1 C9 59 10 04 C9 3C
>1868 10 5C C8 C0 02 F0 07 AD
>1870 C2 18 C9 03 F0 D0 A5 2B
>1878 18 69 28 85 2B A5 2C 69
>1880 00 85 2C CA F0 09 A0 00
>1888 AD C3 18 C9 03 F0 B7 AD
>1890 C5 18 C9 16 D0 11 AD C3
>1898 18 C9 03 D0 0A A6 2F BD
>18A0 F4 14 30 03 20 28 1A A6
>18A8 2F AD C2 18 9D F0 14 AD
>18B0 C4 18 9D E8 14 AD C3 18
>18B8 9D F8 14 AD C5 18 9D EC
>18C0 14 60 00 00 00 00 4C 16
>18C8 19 C8 20 9B 22 20 4E 1B
>18D0 20 86 19 CE 07 1B A9 04
>18D8 8D 30 1E A0 19 20 13 1E
>18E0 A6 2F BD F0 14 8D C2 18
>18E8 BD E8 14 8D C4 18 BD F8
>18F0 14 8D C3 18 BD EC 14 8D
>18F8 C5 18 A5 32 D0 0C BD 14
>1900 15 49 FF 18 69 01 9D 14
>1908 15 60 BD F4 14 49 FF 18
>1910 69 01 9D F4 14 60 C9 40
>1918 10 3C C9 3E 10 18 C9 3C
>1920 D0 01 C8 E6 3A A9 4B 85
>1928 39 A5 3A C9 02 10 37 A9
>1930 42 8D 15 FF D0 30 D0 01
>1938 C8 8E CC 1B A6 2F BD FC
>1940 14 9D 7E 19 FE FC 14 BD
>1948 00 15 9D 82 19 FE 00 15
>1950 AE CC 1B 4C 66 19 D0 01
>1958 C8 A9 02 85 37 A9 D5 8D
>1960 04 14 A9 4B 85 38 20 B3
>1968 22 4C D0 18 A9 03 85 37
>1970 A9 55 8D 04 14 D0 EF 00
>1978 01 00 1B 1D 00 00 00 00
>1980 00 00 00 00 00 00 AD C5
>1988 18 18 7D 77 19 8D 7C 19
>1990 98 18 6D C4 18 8D 7D 19
>1998 AD 7C 19 29 01 AA BD 7A
>19A0 19 8D 7C 19 AD 7D 19 49
>19A8 FF 29 01 18 6D 7C 19 91
>19B0 2B 29 01 18 6D 7C 19 8D
>19B8 7C 19 A5 2B 38 E9 01 85
>19C0 2B A5 2C E9 00 85 2C AD
>19C8 7C 19 91 2B 4C A5 1F 38
>19D0 E9 59 0A 0A 0A A8 8A 85
>19D8 3F 0A 0A 0A AA A9 07 85
>19E0 32 B9 C8 32 9D E8 32 E8
>19E8 C8 C6 32 10 F4 4C 00 16
>19F0 A5 34 0A 0A 0A 8D 79 1A
>19F8 A5 33 0A 18 6D 79 1A 8D
>1A00 79 1A CE 79 1A CE 79 1A
>1A08 A5 35 38 E9 02 A8 B9 25
>1A10 1A 18 6D 79 1A 8D 7B 1A
>1A18 EE 7B 1A EE 7B 1A EE 7B
>1A20 1A EE 7B 1A 60 10 18 00
>1A28 A6 2F A5 34 38 E9 02 DD
>1A30 E8 14 10 44 A5 34 18 65
>1A38 35 18 69 02 DD E8 14 30
>1A40 37 BD E8 14 0A 0A 0A 8D
>1A48 7A 1A BD F0 14 0A 18 6D
>1A50 7A 1A 8D 7A 1A CD 79 1A
>1A58 30 1E AD 7B 1A CD 7A 1A
>1A60 30 16 68 68 A5 32 8D 7C
>1A68 1A A9 01 85 32 20 E0 18
>1A70 AD 7C 1A 85 32 4C 7E 1A
>1A78 60 00 00 00 00 00 20 B3
>1A80 22 A6 2F A5 35 38 E9 02
>1A88 A8 B9 25 1A 4A 18 6D 79
>1A90 1A 8D 7C 1A CD 7A 1A F0
>1A98 2B 18 69 02 CD 7A 1A F0
>1AA0 23 AD 79 1A 18 69 06 CD
>1AA8 7A 1A 10 34 AD 7B 1A 38
>1AB0 E9 06 CD 7A 1A 30 44 BD
>1AB8 7E 19 9D FC 14 BD 82 19
>1AC0 9D 00 15 60 A9 FF 9D F4
>1AC8 14 AD 7D 1A 9D 14 15 A9
>1AD0 01 9D 00 15 9D 82 19 A9
>1AD8 00 9D FC 14 9D 7E 19 60
>1AE0 A9 FF 9D 14 15 A9 FF 9D
>1AE8 F4 14 A9 01 9D FC 14 9D
>1AF0 7E 19 A9 00 9D 00 15 9D
>1AF8 82 19 60 A9 01 9D 14 15
>1B00 A9 FF 9D F4 14 30 E3 00
>1B08 AD 1B 1B 6D 1A 1B 0A 0A
>1B10 18 69 01 6D 1A 1B 8D 1A
>1B18 1B 60 00 00 00 00 00 00
>1B20 00 00 00 00 00 00 00 00
>1B28 00 00 00 00 00 00 00 00
>1B30 00 00 00 00 00 00 00 00
>1B38 00 00 00 00 00 00 00 00
>1B40 00 00 00 00 00 00 00 00
>1B48 00 00 00 00 00 00 8E CC
>1B50 1B 20 5A 11 B1 2D 29 0F
>1B58 C9 08 30 61 AD 02 FF 29
>1B60 03 D0 56 AD 07 1B C9 03
>1B68 30 4F A2 00 BD 1E 1B D0
>1B70 42 B1 2D 9D 3E 1B 98 18
>1B78 65 2B 85 2B A5 2C 69 00
>1B80 85 2C A5 2B 38 E9 01 85
>1B88 2B A5 2C E9 00 85 2C 20
>1B90 5A 11 FE 1E 1B A5 2D 9D
>1B98 26 1B A5 2E 9D 2E 1B 68
>1BA0 68 A9 64 9D 36 1B A9 02
>1BA8 8D 30 1E A0 01 20 13 1E
>1BB0 4C E0 18 E8 EC 1D 1B D0
>1BB8 B3 AE CC 1B 60 A9 02 8D
>1BC0 30 1E A0 01 20 13 1E 68
>1BC8 68 4C E0 18 00 4C A4 1C
>1BD0 4C AC 1C 4C 72 1C A2 00
>1BD8 BD 1E 1B F0 2E C9 02 F0
>1BE0 F2 C9 03 F0 E8 C9 04 F0
>1BE8 E7 BD 26 1B 85 2B BD 2E
>1BF0 1B 85 2C A5 3C 29 07 09
>1BF8 30 A0 00 91 2B C8 91 2B
>1C00 A5 3C 29 03 D0 05 DE 36
>1C08 1B F0 18 E8 EC 1D 1B D0
>1C10 C7 60 A2 07 A9 00 9D 1E
>1C18 1B CA 10 F8 8D 18 15 8D
>1C20 19 15 60 BD 26 1B 85 2B
>1C28 BD 2E 1B 85 2C DE 1E 1B
>1C30 BD 1E 1B D0 1C AD 07 1B
>1C38 C9 03 30 15 AD 00 FF 29
>1C40 03 F0 0E 18 69 01 9D 1E
>1C48 1B A9 96 9D 36 1B 4C 56
>1C50 1C A9 00 9D 1E 1B A0 00
>1C58 BD 3E 1B 91 2B C8 91 2B
>1C60 A5 2C 18 69 04 85 2C A9
>1C68 3B 91 2B 88 A9 3A 91 2B
>1C70 D0 99 A9 3C 8D CC 1B BD
>1C78 26 1B 85 2B BD 2E 1B 18
>1C80 69 04 85 2C A0 00 B1 2B
>1C88 C9 20 30 28 AD CC 1B 91
>1C90 2B C8 18 69 01 91 2B 20
>1C98 5A 11 A9 3C 91 2D 88 91
>1CA0 2D 4C 00 1C A9 3E 8D CC
>1CA8 1B 4C 77 1C A9 40 8D CC
>1CB0 1B 4C 77 1C A9 00 9D 1E
>1CB8 1B 4C 0B 1C A2 00 BD 18
>1CC0 15 D0 41 A5 34 9D E8 14
>1CC8 A9 16 9D EC 14 9D 18 15
>1CD0 A9 00 9D F0 14 9D 7E 19
>1CD8 9D 82 19 9D F8 14 9D FC
>1CE0 14 9D 00 15 A5 3C 29 01
>1CE8 A8 B9 1C 15 9D 14 15 A9
>1CF0 FF 9D F4 14 EE 1E 15 8A
>1CF8 0A 0A AA A4 34 B9 70 0F
>1D00 9D 04 15 60 E8 E0 04 D0
>1D08 B5 A5 3C 29 0F D0 22 A5
>1D10 39 F0 0D C6 39 D0 09 A9
>1D18 00 85 3A A9 42 8D 15 FF
>1D20 A5 38 F0 0D C6 38 D0 09
>1D28 A9 03 85 37 A9 55 8D 04
>1D30 14 60 00 A9 00 8D 32 1D
>1D38 AD 65 1D D0 23 AD F6 1D
>1D40 30 16 A9 FB 20 70 DB 29
>1D48 40 D0 0E AD 5F 1D D0 08
>1D50 20 F7 1D A9 02 8D 32 1D
>1D58 60 A9 00 8D 5F 1D 60 00
>1D60 60 35 34 33 27 00 AD 1C
>1D68 1B 29 03 A8 B9 61 1D 8D
>1D70 17 FF 98 0A 0A 0A 0A 0A
>1D78 A8 A2 00 B9 80 33 9D D8
>1D80 30 C8 E8 E0 20 D0 F4 60
>1D88 A2 06 8E CA 1D E0 00 30
>1D90 22 E0 07 10 1E BD B6 1E
>1D98 85 2B BD AF 1E 85 2C A0
>1DA0 00 98 18 69 50 91 2B 20
>1DA8 5A 11 A9 3A 91 2D C8 C0
>1DB0 03 D0 EE CA D0 D7 60 A2
>1DB8 04 A9 30 8D 19 26 9D 61
>1DC0 0D A9 57 9D 61 09 CA 10
>1DC8 F0 60 00 57 32 A5 3C 4A
>1DD0 4A 4A 29 01 AA A0 00 BD
>1DD8 CB 1D 99 61 09 C8 C0 05
>1DE0 D0 F5 20 0A 21 4C FE 21
>1DE8 A2 04 8E F6 1D A9 53 9D
>1DF0 F9 21 CA 10 F8 60 00 A5
>1DF8 3C 29 01 D0 15 AE F6 1D
>1E00 FE F9 21 BD F9 21 C9 57
```

```
>1E08 D0 08 A9 20 9D F9 21 CE
>1E10 F6 1D 60 AE 30 1E FE 61
>1E18 0D BD 61 0D C9 3A 30 0C
>1E20 18 69 F6 9D 61 0D CA 10
>1E28 ED EE 19 26 88 D0 E4 60
>1E30 00 20 E8 1D AE CA 1D BD
>1E38 B6 1E 85 2B BD AF 1E 85
>1E40 2C E0 07 10 0F E0 00 30
>1E48 0B A0 00 A9 20 91 2B C8
>1E50 C0 03 D0 F7 CE CA 1D F0
>1E58 50 A9 FF 8D CA 12 20 D0
>1E60 21 A9 00 8D 63 1F A9 03
>1E68 85 37 A9 55 8D 04 14 A9
>1E70 00 85 3A 85 39 85 38 8D
>1E78 A3 1F 8D 1E 15 A9 01 8D
>1E80 65 1D 8D 5F 1D 20 44 13
>1E88 20 BD 14 20 CD 1D A5 3B
>1E90 29 40 F0 F1 20 44 13 20
>1E98 BD 14 20 CD 1D A5 3B 29
>1EA0 40 D0 F1 20 DD 14 4C 72
>1EA8 10 20 25 1F 4C 1A 26 00
>1EB0 0C 0C 0C 0F 0F 0F 00 4A
>1EB8 9A EA 1A 6A BA AD 1C 1B
>1EC0 0A 0A 18 6D CA 1D A8 A9
>1EC8 02 8D 30 1E 20 13 1E AD
>1ED0 E6 10 18 69 20 8D E6 10
>1ED8 AD E7 10 69 00 8D E7 10
>1EE0 20 25 1F A9 60 8D 7C 15
>1EE8 20 1F 15 A9 4C 8D 7C 15
>1EF0 20 EE 21 EE 1C 1B AD 1C
>1EF8 1B C9 25 D0 05 A9 00 8D
>1F00 1C 1B A9 0C 8D 5D 13 20
>1F08 51 13 20 D1 10 A9 0D 8D
>1F10 5D 13 20 E3 21 AD 1E 15
>1F18 18 6D 63 1F 38 E9 01 8D
>1F20 63 1F 4C 66 1E A9 00 8D
>1F28 14 15 8D 15 15 8D F4 14
>1F30 8D F5 14 A9 80 8D 30 1E
>1F38 A9 00 8D 16 15 8D 17 15
>1F40 8D F6 14 8D F7 14 20 44
>1F48 13 20 5C 12 20 44 14 20
>1F50 27 12 20 1F 15 20 CD 1D
>1F58 CE 30 1E D0 E9 60 12 0F
>1F60 15 0E 04 00 A2 04 BD 5E
>1F68 1F 9D 51 0E A9 44 9D 51
>1F70 0A CA 10 F2 A9 30 8D A3
>1F78 0E 8D A4 0E 8D A2 0E A9
>1F80 53 8D A3 0A 8D A4 0A 8D
>1F88 A2 0A 60 A2 02 FE A2 0E
>1F90 BD A2 0E C9 3A D0 08 A9
>1F98 30 9D A2 0E CA 10 EE 60
>1FA0 00 00 00 00 00 20 08 1B
>1FA8 29 07 D0 2F AD 07 1B C9
>1FB0 03 30 28 AD A3 1F D0 23
>1FB8 A5 3C 29 01 8D A3 1F EE
>1FC0 A3 1F 98 18 65 2B 8D A0
>1FC8 1F A5 2C 69 00 8D A1 1F
>1FD0 A9 03 8D A2 1F 20 FB 1F
>1FD8 4C DC 1F 60 AD A3 1F F0
>1FE0 FA AD A0 1F 85 2B AD A1
>1FE8 1F 85 2C A0 00 AD A4 1F
>1FF0 91 2B 60 AD A3 1F F0 E3
>1FF8 20 B0 20 AD A0 1F 85 2B
>2000 AD A1 1F 85 2C A0 00 B1
>2008 2B 8D A4 1F C9 60 10 58
>2010 C9 40 10 6C C9 20 10 4D
>2018 0A 0A 0A A8 A2 00 B9 00
>2020 30 9D 08 31 E8 C8 E0 08
>2028 D0 F4 A2 02 AD A2 1F 0A
>2030 A8 A9 C3 39 08 31 09 14
>2038 99 08 31 C8 CA D0 F2 A9
>2040 21 A0 00 91 2B AD A4 1F
>2048 C9 59 30 18 C9 5D 10 14
>2050 EE CA 12 A9 00 8D A3 1F
>2058 AD CA 12 C9 06 30 05 A9
>2060 00 8D CA 12 60 4C 98 20
>2068 38 E9 60 0A 0A 0A A8 A2
>2070 00 B9 00 33 9D 08 31 E8
>2078 C8 E0 08 D0 F4 4C 2A 20
>2080 38 E9 40 0A 0A 0A A8 A2
>2088 00 B9 00 32 9D 08 31 E8
>2090 C8 E0 08 D0 F4 4C 2A 20
>2098 38 E9 20 0A 0A 0A A8 A2
>20A0 00 B9 00 31 9D 08 31 E8
>20A8 C8 E0 08 D0 F4 4C 2A 20
>20B0 EE A2 1F AD A2 1F 29 03
>20B8 8D A2 1F D0 1C AD A0 1F
>20C0 18 69 28 8D A0 1F AD A1
>20C8 1F 69 00 8D A1 1F C9 10
>20D0 D0 07 68 68 A9 00 8D A3
>20D8 1F 60 20 10 0F 17 05 12
>20E0 20 00 20 03 15 12 05 20
>20E8 20 00 20 05 18 09 14 20
>20F0 20 00 20 18 02 01 0C 0C
>20F8 20 00 20 18 0C 09 06 05
>2100 20 00 20 17 01 0C 0C 20
>2108 20 00 AD CA 12 30 24 0A
>2110 0A 0A A8 A5 3C 29 07 0A
>2118 0A 0A 0A 09 06 85 30 A2
>2120 00 B9 DA 20 9D 00 0E A5
>2128 30 9D 00 0A E8 C8 E0 07
>2130 D0 EF 60 A2 06 A9 20 9D
>2138 00 0E CA 10 F8 60 A5 3B
>2140 29 02 D0 05 AD CA 12 10
>2148 01 60 C9 00 D0 06 20 E8
>2150 1D 4C CA 21 C9 01 D0 25
>2158 A9 00 85 39 85 3A 85 38
>2160 A9 03 85 37 A9 55 8D 04
>2168 14 A2 02 BD 7E 19 9D FC
>2170 14 BD 82 19 9D 00 15 CA
>2178 10 F1 4C CA 21 C9 05 D0
>2180 18 A2 00 8A 29 01 18 69
>2188 25 9D C0 0F A9 3E 9D C0
>2190 0B E8 E0 20 D0 ED 4C CA
>2198 21 C9 03 D0 11 AD 1E 15
>21A0 18 6D 63 1F C9 03 F0 A1
>21A8 EE 63 1F 4C CA 21 C9 02
>21B0 D0 08 20 CA 21 68 68 4C
>21B8 CF 1E AD CA 1D C9 FF F0
>21C0 0E EE CA 1D AE CA 1D 20
>21C8 8D 1D A9 FF 8D CA 12 60
>21D0 A2 00 8A 49 FF 29 01 18
>21D8 69 1B 9D C0 0F E8 E0 20
>21E0 D0 F0 60 A2 07 A9 00 9D
>21E8 1E 1B CA 10 F8 60 A2 03
>21F0 A9 00 9D 18 15 CA 10 F8
>21F8 60 00 00 00 00 00 AD 63
>2200 1F F0 10 AD 1E 15 F0 0B
>2208 A5 3C 29 40 D0 1B AD F6
>2210 1D 30 16 A2 04 BD F9 21
>2218 9D B1 0D A9 45 9D B1 09
>2220 CA 10 F2 60 12 05 01 04
>2228 19 A2 04 BD 24 22 9D B1
>2230 0D A9 62 9D B1 09 CA 10
>2238 F2 60 AD 63 1F F0 14 A5
>2240 3B 29 01 D0 0F AD 5A 22
>2248 D0 09 CE 63 1F EE 5A 22
>2250 4C BC 1C 60 A9 00 8D 5A
>2258 22 60 00 AD 11 FF 29 80
>2260 09 08 8D 11 FF A9 00 8D
>2268 74 22 8D 75 22 8D 0E FF
>2270 8D 0F FF 60 00 00 AD 74
>2278 22 F0 0D CE 74 22 D0 08
>2280 AD 11 FF 29 EF 8D 11 FF
>2288 AD 75 22 F0 0D CE 75 22
>2290 D0 08 AD 11 FF 29 DF 8D
>2298 11 FF 60 A9 05 8D 75 22
>22A0 A9 B0 8D 0F FF A9 03 8D
>22A8 10 FF AD 11 FF 09 20 8D
>22B0 11 FF 60 A9 05 8D 74 22
>22B8 A9 80 8D 0E FF AD 12 FF
>22C0 09 03 8D 12 FF AD 11 FF
>22C8 09 10 8D 11 FF 60 A9 05
>22D0 8D 74 22 A9 60 8D 0E FF
>22D8 AD 12 FF 09 03 8D 12 FF
>22E0 AD 11 FF 09 10 8D 11 FF
>22E8 60 00 00 00 1F 00 00 00
>22F0 1F 00 00 1F 1F 1F 00 1F
>22F8 1F 00 1F 00 1F 00 00 00
>2300 1F 00 00 1F 00 1F 00 1F
>2308 00 1F 1F 1F 00 1F 00 1F
>2310 00 1F 00 1F 00 1F 00 1F
>2318 00 1F 00 1F 00 1F 00 00
>2320 00 00 1F 00 00 1F 1F 00
>2328 00 1F 1F 00 1F 00 1F 00
>2330 1F 00 1F 00 1F 00 1F 00
>2338 1F 00 00 00 1F 1F 00 1F
>2340 1F 1F 00 1F 00 1F 00 1F
>2348 00 1F 00 1F 00 1F 00 1F
>2350 00 1F 00 1F 00 00 1F 00
>2358 1F 00 00 00 1F 00 00 1F
>2360 1F 1F 00 1F 1F 00 00 00
>2368 1F 00 1F 00 1F 00 00 1F
>2370 A9 05 20 D2 FF A9 93 20
>2378 D2 FF 20 EE 21 A2 00 DE
>2380 00 0C DE 00 0D DE 00 0E
>2388 DE 00 0F A9 79 9D 00 08
>2390 9D 00 09 9D 00 0A 9D 00
>2398 0B CA D0 E3 BD E9 22 9D
>23A0 CE 0C D0 05 A9 32 9D CE
>23A8 08 BD 04 23 9D F6 0C D0
>23B0 05 A9 32 9D F6 08 BD 1F
>23B8 23 9D 1E 0D D0 05 A9 36
>23C0 9D 1E 09 BD 3A 23 9D 46
>23C8 0D D0 05 A9 36 9D 46 09
>23D0 BD 55 23 9D 6E 0D D0 05
>23D8 A9 67 9D 6E 09 E8 E0 1B
>23E0 D0 BA A2 00 BD BF 24 9D
>23E8 5F 0E A9 45 9D 5F 0A E8
>23F0 E0 19 D0 F0 A2 27 A9 1A
>23F8 9D 98 0F A9 00 9D 98 0B
>2400 CA 10 F3 AD 00 FF 29 1F
>2408 85 34 20 BC 1C 20 08 1B
>2410 29 1F 85 34 20 BC 1C A9
>2418 32 8D BE 24 AD 02 FF 29
>2420 1F 69 04 85 34 20 BC 1C
>2428 A9 48 8D 07 1B A9 EA 8D
>2430 82 15 8D 83 15 8D 84 15
>2438 A9 27 8D 31 17 20 44 13
>2440 20 1F 15 20 E5 27 20 CB
>2448 12 A5 3B 29 40 F0 10 AD
>2450 07 1B F0 0B A5 3C 29 1F
>2458 D0 E3 CE BE 24 D0 DE A9
>2460 20 8D 82 15 A9 27 8D 83
>2468 15 A9 12 8D 84 15 A9 1F
>2470 8D 31 17 A5 3B 29 40 F0
>2478 03 4C 94 25 4C 0F 26 01
>2480 20 02 20 03 20 04 20 05
>2488 20 06 20 07 20 08 20 09
>2490 20 0A 20 0B 0C 20 0D 20
>2498 0E 20 0F 20 10 20 11 20
>24A0 12 20 13 20 14 20 15 20
>24A8 16 17 20 18 20 19 20 1A
>24B0 20 05 0E 04 20 13 10 01
>24B8 03 05 20 04 05 0C 00 17
>24C0 12 09 14 14 05 0E 1F 02
>24C8 19 1F 0B 05 16 09 0E 1F
>24D0 0C 01 17 12 05 0E 03 05
>24D8 67 45 46 44 44 A9 26 85
>24E0 40 A9 28 85 41 20 08 1B
>24E8 65 3C 6D 00 FF C9 00 30
>24F0 F9 C9 25 10 F5 AA CA 30
>24F8 10 A5 40 18 69 20 85 40
>2500 A5 41 69 00 85 41 4C F6
>2508 24 A5 40 8D E6 10 A5 41
>2510 8D E7 10 4C E1 10 30 31
>2518 30 30 30 30 20 20 0B 05
>2520 16 09 0E 20 20 20 30 30
>2528 35 30 30 30 20 20 0B 09
>2530 0E 13 0C 05 19 20 30 30
>2538 33 30 30 30 20 20 0C 0F
>2540 15 09 13 05 20 20 30 30
>2548 32 30 30 30 20 20 0D 05
>2550 0C 01 0E 09 05 20 30 30
```

```
>2558 31 30 30 30 20 20 13 01
>2560 0D 01 0E 14 08 01 30 30
>2568 30 30 30 30 20 20 00 00
>2570 00 00 00 00 00 00 07 12
>2578 05 01 14 20 20 13 03 0F
>2580 12 05 14 08 05 20 02 09
>2588 07 20 12 05 02 0F 15 0E
>2590 04 05 12 13 A9 93 20 D2
>2598 FF A9 16 85 40 A9 25 85
>25A0 41 A9 D4 85 2B A9 0C 85
>25A8 2C A2 00 A0 00 B1 40 91
>25B0 2B 20 5A 11 BD D8 24 91
>25B8 2D C8 C0 10 D0 EF A5 40
>25C0 18 69 10 85 40 A5 41 69
>25C8 00 85 41 A5 2B 18 69 50
>25D0 85 2B A5 2C 69 00 85 2C
>25D8 E8 E0 05 D0 CE A9 32 8D
>25E0 BE 24 A2 11 BD 82 25 9D
>25E8 0B 0C A9 43 9D 0B 08 CA
>25F0 10 F2 20 44 13 20 E5 27
>25F8 20 CB 12 A5 3B 29 40 F0
>2600 0E A5 3C 29 1F D0 EB CE
>2608 BE 24 D0 E6 4C 70 23 A9
>2610 FB 20 70 DB 29 40 F0 F7
>2618 60 00 A2 04 BD 61 0D 9D
>2620 67 25 CA 10 F7 AD 19 26
>2628 8D 66 25 A2 00 BD 56 25
>2630 DD 66 25 F0 04 10 07 30
>2638 08 E8 E0 06 D0 EF 4C 00
>2640 10 A9 93 20 D2 FF A2 00
>2648 BD 7F 24 9D 21 0D A9 32
>2650 9D 21 09 BD 94 24 9D 71
>2658 0D A9 32 9D 71 09 BD A9
>2660 24 9D C1 0D A9 32 9D C1
>2668 09 E8 E0 15 D0 DA A2 0B
>2670 BD 76 25 9D 0E 0C A9 67
>2678 9D 0E 08 CA 10 F2 A2 05
>2680 BD 66 25 9D 89 0C A9 56
>2688 9D 89 08 CA 10 F2 A9 A9
>2690 85 30 A9 00 85 32 20 44
>2698 13 20 44 13 20 44 13 A9
>26A0 FB 20 70 DB 85 3B A6 30
>26A8 A9 32 9D 21 09 A4 32 A9
>26B0 20 99 90 0E A5 3B 29 04
>26B8 D0 08 CA BD 21 0D C9 20
>26C0 F0 F8 A5 3B 29 08 D0 08
>26C8 E8 BD 21 0D C9 20 F0 F8
>26D0 A5 3B 29 40 D0 14 E0 7F
>26D8 30 04 E0 A8 10 25 BD 21
>26E0 0D 99 68 0E C8 C0 08 D0
>26E8 01 88 86 30 84 32 A9 72
>26F0 9D 21 09 A9 00 99 90 0E
>26F8 A9 FB 20 70 DB 29 40 F0
>2700 F7 D0 93 E0 B2 10 1D E0
>2708 AB 10 24 A2 00 BD 68 0E
>2710 9D 6E 25 E8 E0 08 D0 F5
>2718 A9 FB 20 70 DB 29 40 F0
>2720 F7 4C 36 27 A9 20 99 68
>2728 0E 88 10 BE C8 10 BB A9
>2730 20 99 68 0E D0 AE A9 00
>2738 85 30 A9 16 85 40 A9 25
>2740 85 41 A2 00 A0 00 A5 40
>2748 18 69 10 85 2B A5 41 69
>2750 00 85 2C B1 40 D1 2B F0
>2758 04 10 07 30 22 C8 C0 06
>2760 D0 F1 A5 40 18 69 10 85
>2768 40 A5 41 69 00 85 41 E8
>2770 E0 05 D0 D0 E6 30 A5 30
>2778 C9 05 D0 BE 4C 00 10 A0
>2780 00 B1 40 8D 96 27 B1 2B
>2788 91 40 AD 96 27 91 2B C8
>2790 C0 10 D0 ED F0 CC 00 A9
>2798 BF 20 70 DB 29 10 D0 05
>27A0 68 68 4C 00 10 60 A9 FE
>27A8 20 70 DB 29 08 D0 F6 A9
>27B0 EA 8D F5 11 8D F6 11 8D
>27B8 F7 11 A9 FE 20 70 DB 29
>27C0 08 F0 F7 A9 FE 20 70 DB
>27C8 29 08 D0 F7 A9 FE 20 70
```

```
>27D0 DB 29 08 F0 EE A9 20 8D
>27D8 F5 11 A9 AB 8D F6 11 A9
>27E0 13 8D F7 11 60 A9 FE 20
>27E8 70 DB 29 02 CD 24 28 F0
>27F0 0A 8D 24 28 C9 00 D0 03
>27F8 EE 25 28 AD 25 28 29 01
>2800 F0 11 A2 05 BD 1E 28 9D
>2808 D0 0F A9 46 9D D0 0B CA
>2810 10 F2 60 A2 05 A9 20 9D
>2818 D0 0F CA 10 F8 60 12 01
>2820 0E 04 0F 0D 00 01 00 00
>2828 08 00 0A 00 0E 80 07 A0
>2830 01 E8 00 78 00 1C 00 04
>2838 00 00 00 00 00 00 00 00
>2840 00 00 00 00 00 00 00 00
>2848 00 00 FF FF FF FF 55 55
>2850 55 55 FF FF FF FF AA AA
>2858 AA AA 00 00 00 00 00 00
>2860 00 00 00 00 00 00 00 00
>2868 14 00 14 00 00 00 00 F0
>2870 00 F0 00 0A 00 0A 00 28
>2878 00 28 00 04 00 06 00 02
>2880 00 02 00 00 00 00 00 00
>2888 00 00 00 00 03 C0 00 F0
>2890 00 30 00 AA 02 33 15 55
>2898 AA AA 0A AA 00 55 00 00
>28A0 00 00 00 00 00 00 00 00
>28A8 00 00 00 00 00 00 00 05
>28B0 00 28 00 6F 00 4E 00 4E
>28B8 00 6F 00 28 00 05 00 00
>28C0 00 00 00 00 00 00 02 80
>28C8 3E BC 32 8C 36 9C 35 5C
>28D0 35 5C 35 5C 36 9C 32 8C
>28D8 3E BC 02 80 00 00 00 00
>28E0 00 00 00 00 00 00 00 00
>28E8 00 00 00 00 00 00 F0 0A
>28F0 0F AA 0A AA 0A 5A 0A AA
>28F8 00 AA 0F A5 F0 0A 00 00
>2900 00 00 00 00 00 00 20 00
>2908 20 00 20 00 21 00 21 00
>2910 21 2A 21 2F 20 2F 00 2A
>2918 00 00 00 00 00 00 00 00
>2920 00 00 00 00 00 00 00 00
>2928 00 00 0B F0 09 70 0E 70
>2930 0E F0 0E F0 0F B0 0F B0
>2938 0D B0 0D 60 0F 60 00 00
>2940 00 00 00 00 00 00 00 00
>2948 00 00 55 40 00 00 AA AA
>2950 00 00 55 54 00 00 AA AA
>2958 00 00 55 40 00 00 00 00
>2960 00 00 00 00 00 00 00 00
>2968 05 00 1F 40 1F 40 05 00
>2970 00 01 00 06 00 06 00 01
>2978 05 00 1F 40 1F 40 05 00
>2980 00 00 00 00 00 00 00 00
>2988 00 00 00 00 03 0F 03 FF
>2990 00 FB 00 3B 00 0A 00 02
>2998 00 02 00 02 00 09 00 15
>29A0 00 00 00 00 00 00 00 00
>29A8 00 00 00 02 00 0B 00 2F
>29B0 00 BD 02 FD 0B D5 02 FD
>29B8 00 BD 00 2F 00 0B 00 02
>29C0 00 00 00 00 00 00 00 00
>29C8 00 00 00 00 00 00 10 04
>29D0 14 14 35 5C 0D 70 07 D0
>29D8 17 D4 1C 34 30 0C 00 00
>29E0 00 00 00 00 00 00 00 00
>29E8 00 00 00 00 00 00 00 55
>29F0 0A AA AA FA AA AA 0A AF
>29F8 00 AA 0A 00 A0 00 00 00
>2A00 00 00 00 00 00 00 00 00
>2A08 00 00 00 00 00 00 3F FF
>2A10 3C 00 3C 2A 00 95 AA 6A
>2A18 55 95 AA 40 55 00 00 00
>2A20 00 00 00 00 00 00 00 00
>2A28 00 00 00 00 04 00 01 40
>2A30 01 D5 00 7F 00 1F A0 05
>2A38 20 02 20 2A 28 20 00 20
>2A40 00 00 00 00 00 00 00 00
```

```
>2A48 00 00 00 00 00 AA AA 80
>2A50 80 03 80 0F 95 55 95 55
>2A58 80 0F 80 03 AA 80 00 AA
>2A60 00 00 00 00 00 00 00 00
>2A68 00 00 00 00 00 0C 0C 00
>2A70 0F 03 00 0F 03 02 00 01
>2A78 03 02 00 0F 0F 03 0C 00
>2A80 00 0C 00 00 00 00 00 00
>2A88 00 00 01 00 11 44 55 54
>2A90 5F F5 70 0D 70 0D 70 AD
>2A98 70 AD 5F F5 15 54 10 10
>2AA0 00 00 00 00 00 00 00 00
>2AA8 FF FF C0 00 AA AA 40 00
>2AB0 55 55 40 00 AA AA C0 00
>2AB8 FF FF 00 00 00 00 00 00
>2AC0 00 00 00 00 00 00 00 00
>2AC8 00 00 FF 55 D7 7D D7 7D
>2AD0 FF 55 00 00 00 55 AA 00
>2AD8 00 00 FF AA EB BE EB BE
>2AE0 FF AA 00 00 00 00 00 00
>2AE8 00 00 00 00 00 00 08 00
>2AF0 08 38 08 38 0A BA 00 AA
>2AF8 00 82 00 00 00 00 00 00
>2B00 00 00 00 00 00 00 00 00
>2B08 00 00 00 00 00 00 FF FF
>2B10 3F FF 05 55 02 28 02 28
>2B18 05 55 3F FF FF FF 00 00
>2B20 00 00 00 00 00 00 FF F6
>2B28 F0 F6 C0 36 0F 06 3F C2
>2B30 FF F0 F0 F0 C0 30 00 00
>2B38 00 00 00 00 00 00 00 00
>2B40 00 00 00 00 00 00 00 00
>2B48 00 00 08 0F 2A 3F A2 F3
>2B50 A2 C3 A2 FD 2A FD 0A 3D
>2B58 02 01 00 00 00 00 00 00
>2B60 00 00 00 00 00 00 00 00
>2B68 03 00 03 30 0F FF 3E AA
>2B70 FA AA FA BA 3E FE 0F FF
>2B78 3D 55 FF FF 00 00 00 00
>2B80 00 00 00 00 00 00 00 00
>2B88 BA B8 0C 30 0C 30 0D 70
>2B90 15 54 10 04 15 54 0D 70
>2B98 0C 30 0C 30 BA B8 00 00
>2BA0 00 00 00 00 00 00 00 00
>2BA8 00 00 0C 0C 0C 0C 0F FC
>2BB0 0E AC 0E 6C 0E 6C 0E 6C
>2BB8 0E AC 0F FC 0C 0C 0C 0C
>2BC0 00 00 00 00 00 00 11 15
>2BC8 11 1A 11 12 11 1A 51 12
>2BD0 01 12 15 1A 00 12 01 52
>2BD8 00 00 00 00 00 00 00 00
>2BE0 00 00 00 00 00 00 00 00
>2BE8 00 00 2A 55 0A 00 0C 00
>2BF0 0C 3E 0C 0D 0C 00 0A 00
>2BF8 2A 55 00 00 00 00 00 00
>2C00 00 00 00 00 00 00 00 40
>2C08 00 40 00 10 00 05 00 01
>2C10 00 0F 00 02 00 02 00 08
>2C18 00 20 00 80 00 80 00 00
>2C20 00 00 00 00 00 00 C0 00
>2C28 30 00 04 00 C4 40 32 22
>2C30 04 40 32 22 C4 40 30 00
>2C38 C0 00 00 00 00 00 00 00
>2C40 00 00 00 00 00 00 00 02
>2C48 00 02 00 24 40 23 02 0F
>2C50 02 0F 00 23 40 24 00 02
>2C58 00 02 00 00 00 00 00 00
>2C60 00 00 00 00 00 00 00 01
>2C68 00 01 00 31 03 31 13 31
>2C70 00 00 22 22 22 22 20 20
>2C78 00 00 00 00 00 00 00 00
>2C80 00 00 00 00 00 00 00 00
>2C88 04 00 01 0A 00 6F 00 BA
>2C90 02 E1 0A 81 08 01 00 00
>2C98 00 00 00 00 00 00 00 00
>2CA0 00 00 00 00 00 00 00 00
>2CA8 00 00 00 00 05 00 0F 50
>2CB0 05 F5 0F 5F 05 F5 00 5F
>2CB8 00 05 00 00 00 00 00 00
```

```
>2CC0 00 00 00 00 00 00 FF FF
>2CC8 FF FF FF FF FF FF FF FF
>2CD0 FF FF FF FF FF FF FF FF
>2CD8 FF FF FF FF FF FF FF FF
>2CE0 FF FF FF FF FF FF FF FF
>2CE8 FF FF FF FF FF FF FF FF
>2CF0 FF FF FF FF FF FF FF FF
>2CF8 FF FF FF FF FF FF FF FF
>2D00 00 00 00 00 00 00 00 00
>2D08 00 00 00 00 00 00 00 00
>2D10 00 00 00 00 00 00 00 00
>2D18 00 00 00 00 00 00 00 00
>2D20 00 00 00 00 00 00 00 00
>2D28 00 00 00 00 00 00 00 00
>2D30 00 00 00 00 00 00 00 00
>2D38 00 00 00 00 00 00 00 00
>2D40 00 00 00 00 00 00 00 00
>2D48 00 00 00 00 00 00 00 00
>2D50 00 00 00 00 00 00 00 00
>2D58 00 00 00 00 00 00 00 00
>2D60 00 00 00 00 00 00 00 00
>2D68 00 00 00 00 00 00 00 00
>2D70 00 00 00 00 00 00 00 00
>2D78 00 00 00 00 00 00 00 00
>2D80 FF FF FF FF FF FF FF FF
>2D88 FF FF FF FF FF FF FF FF
>2D90 FF FF FF FF FF FF FF FF
>2D98 FF FF FF FF FF FF FF FF
>2DA0 FF FF FF FF FF FF FF FF
>2DA8 FF FF FF FF FF FF FF FF
>2DB0 FF FF FF FF FF FF FF FF
>2DB8 FF FF FF FF FF FF FF FF
>2DC0 FF FF FF FF FF FF FF FF
>2DC8 FF FF FF FF FF FF FF FF
>2DD0 FF FF FF FF FF FF FF FF
>2DD8 FF FF FF FF FF FF FF FF
>2DE0 FF FF FF FF FF FF FF FF
>2DE8 FF FF FF FF FF FF FF FF
>2DF0 FF FF FF FF FF FF FF FF
>2DF8 FF FF FF FF FF FF FF FF
>2E00 00 00 00 00 00 00 00 00
>2E08 00 00 00 00 00 00 00 00
>2E10 00 00 00 00 00 00 00 00
>2E18 00 00 00 00 00 00 00 00
>2E20 00 00 00 00 00 00 00 00
>2E28 00 00 00 00 00 00 00 00
>2E30 00 00 00 00 00 00 00 00
>2E38 00 00 00 00 00 00 00 00
>2E40 00 00 00 00 00 00 00 00
>2E48 00 00 00 00 00 00 00 00
>2E50 00 00 00 00 00 00 00 00
>2E58 00 00 00 00 00 00 00 00
>2E60 00 00 00 00 00 00 00 00
>2E68 00 00 00 00 00 00 00 00
>2E70 00 00 00 00 00 00 00 00
>2E78 00 00 00 00 00 00 00 00
>2E80 FF FF FF FF FF FF FF FF
>2E88 FF FF FF FF FF FF FF FF
>2E90 FF FF FF FF FF FF FF FF
>2E98 FF FF FF FF FF FF FF FF
>2EA0 FF FF FF FF FF FF FF FF
>2EA8 FF FF FF FF FF FF FF FF
>2EB0 FF FF FF FF FF FF FF FF
>2EB8 FF FF FF FF FF FF FF FF
>2EC0 FF FF FF FF FF FF FF FF
>2EC8 FF FF FF FF FF FF FF FF
>2ED0 FF FF FF FF FF FF FF FF
>2ED8 FF FF FF FF FF FF FF FF
>2EE0 FF FF FF FF FF FF FF FF
>2EE8 FF FF FF FF FF FF FF FF
>2EF0 FF FF FF FF FF FF FF FF
>2EF8 FF FF FF FF FF FF FF FF
>2F00 00 00 00 00 00 00 00 00
>2F08 00 00 00 00 00 00 00 00
>2F10 00 00 00 00 00 00 00 00
>2F18 00 00 00 00 00 00 00 00
>2F20 00 00 00 00 00 00 00 00
>2F28 00 00 00 00 00 00 00 00
>2F30 00 00 00 00 00 00 00 00
>2F38 00 00 00 00 00 00 00 00
>2F40 00 00 00 00 00 00 00 00
>2F48 00 00 00 00 00 00 00 00
>2F50 00 00 00 00 00 00 00 00
>2F58 00 00 00 00 00 00 00 00
>2F60 00 00 00 00 00 00 00 00
>2F68 00 00 00 00 00 00 00 00
>2F70 00 00 00 00 00 00 00 00
>2F78 00 00 00 00 00 00 00 00
>2F80 FF FF FF FF FF FF FF FF
>2F88 FF FF FF FF FF FF FF FF
>2F90 FF FF FF FF FF FF FF FF
>2F98 FF FF FF FF FF FF FF FF
>2FA0 FF FF FF FF FF FF FF FF
>2FA8 FF FF FF FF FF FF FF FF
>2FB0 FF FF FF FF FF FF FF FF
>2FB8 FF FF FF FF FF FF FF FF
>2FC0 FF FF FF FF FF FF FF FF
>2FC8 FF FF FF FF FF FF FF FF
>2FD0 FF FF FF FF FF FF FF FF
>2FD8 FF FF FF FF FF FF FF FF
>2FE0 FF FF FF FF FF FF FF FF
>2FE8 FF FF FF FF FF FF FF FF
>2FF0 FF FF FF FF FF FF FF FF
>2FF8 FF FF FF FF FF FF FF FF
>3000 FE FE FE FE FE FE FE 00
>3008 18 3C 66 7E 66 66 66 00
>3010 7C 66 66 7C 66 66 7C 00
>3018 3C 66 60 60 60 66 3C 00
>3020 78 6C 66 66 66 6C 78 00
>3028 7E 60 60 78 60 60 7E 00
>3030 7E 60 60 78 60 60 60 00
>3038 3C 66 60 6E 66 66 3C 00
>3040 66 66 66 7E 66 66 66 00
>3048 3C 18 18 18 18 18 3C 00
>3050 1E 0C 0C 0C 0C 6C 38 00
>3058 66 6C 78 70 78 6C 66 00
>3060 60 60 60 60 60 60 7E 00
>3068 63 77 7F 6B 63 63 63 00
>3070 66 76 7E 7E 6E 66 66 00
>3078 3C 66 66 66 66 66 3C 00
>3080 7C 66 66 7C 60 60 60 00
>3088 3C 66 66 66 66 3C 0E 00
>3090 7C 66 66 7C 78 6C 66 00
>3098 3C 66 60 3C 06 66 3C 00
>30A0 7E 18 18 18 18 18 18 00
>30A8 66 66 66 66 66 66 3C 00
>30B0 66 66 66 66 66 3C 18 00
>30B8 63 63 63 6B 7F 77 63 00
>30C0 66 66 3C 18 3C 66 66 00
>30C8 66 66 66 3C 18 18 18 00
>30D0 7E 06 0C 18 30 60 7E 00
>30D8 00 00 00 00 00 00 0A 08
>30E0 00 00 AA 82 82 AA A0 20
>30E8 08 0A AA 82 82 AA 00 00
>30F0 20 A0 00 00 00 00 00 00
>30F8 00 00 00 00 00 00 00 00
>3100 00 00 00 00 00 00 00 00
>3108 18 18 18 18 00 00 18 00
>3110 66 66 66 00 00 00 00 00
>3118 66 66 FF 66 FF 66 66 00
>3120 18 3E 60 3C 06 7C 18 00
>3128 5F F7 FD FD F7 5F 00 00
>3130 F5 DF 7F 7F DF F5 00 00
>3138 06 0C 18 00 00 00 00 00
>3140 0C 18 30 30 30 18 0C 00
>3148 30 18 0C 0C 0C 18 30 00
>3150 00 66 3C FF 3C 66 00 00
>3158 00 18 18 7E 18 18 00 00
>3160 00 00 00 00 00 18 18 30
>3168 00 00 00 7E 00 00 00 00
>3170 00 00 00 00 00 18 18 00
>3178 00 03 06 0C 18 30 60 00
>3180 3C 66 6E 76 66 66 3C 00
>3188 18 18 38 18 18 18 7E 00
>3190 3C 66 06 0C 30 60 7E 00
>3198 3C 66 06 1C 06 66 3C 00
>31A0 06 0E 1E 66 7F 06 06 00
>31A8 7E 60 7C 06 06 66 3C 00
>31B0 3C 66 60 7C 66 66 3C 00
>31B8 7E 66 0C 18 18 18 18 00
>31C0 3C 66 66 3C 66 66 3C 00
>31C8 3C 66 66 3E 06 66 3C 00
>31D0 FF FF FF FF FF FF 00 00
>31D8 FC FC FC FC FC FC 00 00
>31E0 FF FF DF F7 DF FF 00 00
>31E8 FC DC 7C 7C DC FC FC 00 00
>31F0 FF FF DF 57 DF FF 00 00
>31F8 FC FC 5C FC 5C FC 00 00
>3200 FF FF D5 D5 FF FF 00 00
>3208 FF FF 6B 6B FF FF 00 00
>3210 AA A9 A9 A9 A9 A9 00 00
>3218 AA 6A AA 6A AA 6A 00 00
>3220 AA B5 B5 B5 B5 AA 00 00
>3228 AA 5E 5E 5E 5E AA 00 00
>3230 AA A9 A5 A5 A9 AA 00 00
>3238 AA 6A 5A 5A 6A AA 00 00
>3240 AA A5 AA FF FF AA 00 00
>3248 AA 5A AA FF FF AA 00 00
>3250 A0 6A A0 00 6A 7C 66 7E
>3258 26 68 30 60 7B FF 7F FF
>3260 FF 7F FF FF FF FF 00 FF
>3268 F9 5F 7F FF D3 00 68 FB
>3270 F7 6C C8 00 00 58 6E 7E
>3278 E8 FF 6B 28 20 E8 DF FB
>3280 F5 F5 F5 F5 00 00 00 00
>3288 55 55 55 55 00 00 00 00
>3290 5F 5F 5F 5F 00 00 00 00
>3298 00 00 FF FF FF FF 00 00
>32A0 00 00 FC FC FC FC 00 00
>32A8 00 00 F0 F0 F0 F0 00 00
>32B0 00 00 C0 C0 C0 C0 00 00
>32B8 18 3C 46 D7 CF 56 3C 18
>32C0 FF FF FF FF 9F FF FF FF
>32C8 88 FF FF FF FF FF FF 97
>32D0 FF FF FF FF FF FF FF FF
>32D8 FF FF FF FF FF FF 94 FF
>32E0 FF FF FF FF BF FF 81 B7
>32E8 FF 00 FF FF FF FF 10 FF
>32F0 FF FF FF FF FF FF 82 FF
>32F8 BD 00 AE 00 80 FF 00 FF
>3300 B6 DF 02 F5 B7 00 00 FF
>3308 FF B4 00 24 00 00 00 00
>3310 00 00 00 00 00 00 00 00
>3318 00 00 00 00 00 00 48 E5
>3320 00 00 20 00 00 00 00 00
>3328 00 00 00 00 00 00 00 00
>3330 00 00 00 00 00 00 00 00
>3338 00 00 00 00 00 00 00 00
>3340 00 00 00 40 00 00 00 7F
>3348 00 00 00 A0 00 12 00 00
>3350 00 00 00 00 00 00 00 FF
>3358 FF 00 FF FF 00 00 10 FF
>3360 00 00 00 00 00 00 00 00
>3368 00 00 00 00 7F 00 00 00
>3370 00 00 00 00 00 00 FF 00
>3378 00 00 00 00 00 00 00 00
>3380 00 00 00 00 00 00 0A 08
>3388 00 00 AA 82 82 AA A0 20
>3390 08 0A AA 82 82 AA 00 00
>3398 20 A0 00 00 00 00 00 00
>33A0 02 02 0A 08 28 20 A0 80
>33A8 80 80 A0 20 28 08 0A 02
>33B0 80 A0 20 28 08 0A 02 02
>33B8 02 0A 08 28 20 A0 80 80
>33C0 20 28 0A 00 00 0A 28 20
>33C8 08 28 A0 00 00 A0 28 08
>33D0 20 28 0A 00 00 0A 28 20
>33D8 08 28 A0 00 00 A0 28 08
>33E0 00 00 00 00 00 0A 2A 2A
>33E8 00 00 28 82 28 00 80 A0
>33F0 0A 02 00 28 82 28 00 00
>33F8 A8 A8 A0 00 00 00 00 00
>3400 FF FF FF FF FF FF FF FF
```

Hide-It

Keep prying eyes out of your programme with this handy utility.

By James R Strang

Hide-It will allow you to protect any Basic programmes that you have produced. It alters a program so that when it is listed, only a single line will be shown and this will only contain a SYS number.

Of course, Hide-It isn't going to stop a determined hacker from breaking into your programmes. It will however deter the casual intruder from listing them.

All of the instructions are printed by the Basic loader program, so you should have no problems using the program.

The machine code version of the program is also reproduced here for anyone who wishes to customize the code. The assembler used to produce the listing is Speedy Assembler which *Your Commodore* is using as a standard for all of its machine code listings.

YC

Getting it all in

You should have no problems entering the Basic loader. The SYNTAX CHECKER program found on the LISTINGS page of this magazine will help check your typing.

As mentioned, the machine code version of the program has been produced using *Your Commodore*'s own SPEEDY ASSEMBLER. You should be able to enter this into any assembler with very few changes.

N.B. You only need to type in the Basic loader to use the program. The machine code is reproduced here for those who want to see how the program works.

```
PROGRAM: HIDE-IT

D5   100 POKE53280,0:POKE53281,0
4B   110 REM*********************
     ******
02   120 REM*** PROGRAM TO HIDE-I
     T  ***
87   130 REM*********************
     ******
B6   140 :
D3   150 REM*********************
     ******
BA   160 REM**        PRESENTED BY
         **
34   170 REM**       JAMES R STRANG
         **
A0   180 REM**         11:08:1985
         **
9B   190 REM*********************
     ******
F2   200 :
56   210 FORB=0TO367:READA:POKE49
     152+B,A:NEXT
D1   219 REM CLR
AA   220 PRINT"[CLR]0SYS2063"
98   230 PRINT"1*****************
     ****************************
     ************************"
07   239 REM RVS- 11*CRD
E4   240 A$="[RVSON,DOWN11]LOAD T
     HE PROGRAM THAT IS TO BE PRO
     TECTED"
D2   249 REM RVS-CRU
6C   250 B$="[RVSON,UP]THEN PUT T
     HE CURSOR OVER  LINE 0 AND H
     IT"
09   259 REM RVS-CRU
7B   260 C$="[RVSON,UP]THE RETURN
     , NOW OVER LINE 1 AND H
     IT"
CF   269 REM RVS-CRU OFF RVS
CD   270 D$="[RVSON,UP]THE RETURN
        IF YOU NOW TYPE  [RVSOFF]
      SYS49152 [RVSON]"
7D   279 REM RVS-CRU
D1   280 E$="[RVSON,UP]THE PROGRA
     M IS NOW PROTECTED FROM PRYI
     NG"
B7   289 REM RVS-CRU
5B   290 F$="[RVSON,UP]EYES. NOW
     SAVE PROTECTED PROGRAM.[SPC7
     ]"
28   299 REM   2*CRD-  5*CRR-RVS
     OFF
12   300 G$="[DOWN2,RIGHT5,RVSON]
      HAPPY PROGRAMMING [RVSOFF]"

82   310 PRINTA$:PRINTB$:PRINTC$:
     PRINTD$:PRINTE$:PRINTF$:PRIN
     TG$
21   319 REM  17*CRU
6E   320 PRINT"[UP17]LOAD";CHR$(3
     4);"FILENAME";CHR$(34);",8":
     NEW
AC   330 DATA 162,0,189,35,192,23
     2,157,14,8,224,67,208,245,16
     9,0,141
0E   340 DATA 11,8,141,12,8,162,0
     ,189,102,192,32,210,255,232,
     224,251
5B   350 DATA 208,245,96,164,46,1
     92,128,16,35,169,195,141,4,1
     28,169,194
3D   360 DATA 141,5,128,169,205,1
     41,6,128,169,56,141,7,128,16
     9,48,141
2E   370 DATA 8,128,169,70,141,0,
     128,169,8,141,1,128,169,193,
     141,24
20   380 DATA 3,169,254,141,25,3,
     169,83,133,43,169,234,141,40
     ,3,32
DC   390 DATA 89,166,76,174,167,0
     ,18,147,17,29,29,29,29,176,1
     92,192
86   400 DATA 192,192,192,192,192
     ,192,192,192,192,192,192,192
     ,192,192,192,192
D2   410 DATA 192,192,192,192,192
     ,192,192,192,192,192,192,192
     ,192,174,18,29
A3   420 DATA 29,29,29,29,29,29,2
     21,80,82,79,84,69,67,84,73,7
     9
68   430 DATA 78,32,83,69,82,86,7
     3,67,69,32,49,57,56,54,32,76

B1   440 DATA 73,77,73,84,69,68,2
     21,18,29,29,29,29,29,29,29,1
     71
74   450 DATA 192,192,192,192,192
     ,192,192,192,192,192,192,192
     ,192,192,192,192
D7   460 DATA 192,192,192,192,192
     ,192,192,192,192,192,192,192
     ,192,192,192,179
CD   470 DATA 18,29,29,29,29,29,2
     9,29,221,32,32,80,82,79,71,8
     2
83   480 DATA 65,77,77,69,32,73,8
     3,32,32,78,79,87,32,80,82,79

91   490 DATA 84,69,67,84,69,68,3
     2,32,221,18,29,29,29,29,29,2
     9
E4   500 DATA 29,173,192,192,192,
     192,192,192,192,192,192,192,
     192,192,192,192
B0   510 DATA 192,192,192,192,192
     ,192,192,192,192,192,192,192
     ,192,192,192,192
24   520 DATA 192,189,146,17,17,1
     7,17,17,17,17,17,17,17,17,17
     ,17
17   530 DATA 17,17,29,29,29,83,6
     5,86,69,34,70,73,76,69,78,65

CC   540 DATA 77,69,34,44,56,44,4
     9,32,32,32,32,32,32,32,32,32

D6   550 DATA 32,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0
```

```
FILENAME: HIDE IT

10      ; ASSEMBLY SOURCE CODE FOR DATA
20      ; SECTION OF HIDE-IT.
30      ; BY JAMES R STRANG.
40      ;
50                 ORG $C000
60                 LDX #$00
70      LA002      LDA LA001,X
80                 INX
90                 STA $080E,X
100                CPX #$43
110                BNE LA002
120                LDA #$00
130                STA $0808
140                STA $080C
150                LDX #$00
160     ;
170     ; READ IN CHARACTERS FROM BYT
180     ;
190     LA004      LDA LA003,X
200     ;
210     ; OUTPUT TO SCREEN
220     ;
230                JSR $FFD2
240                INX
250     ;
260     ; ALL CHARACTERS PRINTED ?
270     ;
280                CPX #$FB
290                BNE LA004
300                RTS
310     LA001      LDY $2E
320                CPY #$80
330     ;
340     ; SET UP NEW POINTERS
350     ;
360                BPL LA005
370                LDA #$C3
380                STA $8004
390                LDA #$C2
400                STA $8005
410                LDA #$CD
420                STA $8006
430                LDA #$38
440                STA $8007
450                LDA #$30
460                STA $8008
470                LDA #$46
480                STA $8000
490                LDA #$08
500                STA $8001
510     LA005      LDA #$C1
520     ;
530     ; VECTORS FOR NMI, NORMALLY $FE47
540     ;
550                STA $0318
560                LDA #$FE
570                STA $0319
580     ;
590     ; VECTOR START OF BASIC
600     ;
610                LDA #$53
620     ;
630     ; MOVES BASIC START TO NEW START
640     ; AFTER MACHINE LANGUAGE
650     ;
660                STA $2B
670                LDA #$EA
680                STA $0328
690     ;
700     ; CLEAR SET POINTERS
710     ;
720                JSR $A659
730     ;
740     ; RUNS FROM START
750     ;
760                JMP $A7AE
770                BRK
780     LA003      BYT 18,147,17
790                BYT 29,29,29,29
800                BYT "┌───────────────"
810                BYT "────────────────"
820                BYT "───────────────┐"
830                BYT 18,29,29,29,29,29
840                BYT 29,29
850                BYT "|PROTECTION "
860                BYT "SERVICE 1986 "
870                BYT "LIMITED|"
880                BYT 18,29,29,29,29,29
890                BYT 29,29
900                BYT "├───────────────"
910                BYT "────────────────"
920                BYT "───────────┤"
930                BYT 18,29,29,29,29,29
940                BYT 29,29
950                BYT "|  PROGRAMME IS "
960                BYT " NOW PROTECTED  |"
970                BYT 18,29,29,29,29,29
980                BYT 29,29
990                BYT "└───────────────"
1000               BYT "────────────────"
1010               BYT "───────────────┘"
1020               BYT 146,17,17,17,17,17
1030               BYT 17,17,17,17,17
1040               BYT 17,17,17,17,17
1050               BYT 29,29,29,"SAVE"
1060               BYT $22,"FILENAME"
1070               BYT $22,",8,1"
1080               BYT "          "
1090    ; 10 SPACES IN ABOVE LINE
```

MAIL ORDER ADVERTISING

British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days,the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, Argus Specialist Publications Ltd will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of this publication, summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent (up to a limit of £2,000 per annum for any one Advertiser so affected and up to £6,000 per annum in respect of all insolvent Advertisers. Claims may be paid for higher amounts, or when the above procedure has not been complied with, at the discretion of this publication but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties).

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements). Classified advertisements are excluded.

Software for Sale

If you think that one of our programmes looks very interesting, but you can't afford the time to type it in then our software service will help you out.

It's three o'clock in the morning. You sit at the computer keyboard just finished a marathon typing session entering one of the superb programmes from *Your Commodore* Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programmes from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programmes is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts HP4 1HL.
TEL: (0447) 7661/4.

please contact this address for prices and availability.

The Disk

Programmes on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programmes much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programmes for these machines will be available on the disk.

What programmes are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programmes are available on which format you will also find a couple of symbols after this strap. The symbols have the following meaning:

This symbol means that the program is available on cassette.

These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programmes on tape. There is no sense in placing a program that expects to be reading from disk on to tape. YC

MAY 1987

LOWER CASE GRAPHICS – Using lower case text on your C16 and Plus/4 graphics screen. (On disk only).
C16 CHARACTER EDITOR – A powerful character editor for the C16 and Plus/4. (On disk only).
EVERYMAN'S GUIDE TO GRAPHICS – All of the programmes from this fascinating article.
C64 SPRITE EDITOR – A comprehensive sprite editor for the C64. Available for both disk and tape.
CEDIT 64 – A character editor with no fewer than 44 different commands. (Available for tape and disk.)
ORDER CODE
DISK YDMAY87 £6.00 TAPE YCMAY87 £4.00

JUNE 1987

DUAL PROGRAMMING Have two programmes in your Plus/4's memory at once. (On disk only.)
EMULATOR 64 – Machine code single stepper for the C64.
SMART LISTER – Make your listings smarter and neater with this program. (C64)
PROCEDURES – Easier programming for the C64 with this program.
C64 SOURCE GENERATOR – A powerful disassembler for the C64.
LIST ENHANCER – Improve the LIST command of your C64.
ANALYSER – A machine code debugger for the C128.
ORDER CODE
DISK YDJUN87 £6.00
TAPE YCJUN87 £4.00

JULY 1987

UTILITY COMMANDS — This provides many vital commands missing from Basic 7.0 on the 128.
PLUS/4 AND C64 CRUNCHER — Speed up your programmes with these handy utilities.

PROGRAMMABLE FUNCTION KEYS — A utility to make more use of the function keys on the C64.
DISKIT 5 — A handy routine to convert memory to data statements on the C64. (Disk only.)
ARCADE ACTION — Get those sprites with these handy arcade routines on the C64.
CROSS REFERENCE — This program helps you sort out your variables on the C64.
SUICIDE RUN — A fast and stimulating game for the C64.

ORDER CODE
DISK YDJULY87 £6.00
TAPE YCJULY87 £4.00

AUGUST 1987

DISKIT 6 — Fast file copier for disk users. (C64 - disk only.)
SCREEN MAKER — Design text and low-res graphic screens with ease. (C64).
SCREEN DUMP — A Hi-Res screen dump for the C64 plus MPS801 printer.
NUMBER BASE TUTOR — A C64 educational program helping with tuition of number bases other than 10.
C16 SPRITE — Does your C16 lack something? Then add sprites with this useful utility. For C16 and Plus/4, available on disk only.
WINDOWS — A text window system for the C64.

Order Codes
DISK YDAUG87 £6.00
TAPE YCAUG87 £4.00

SEPTEMBER 1987

DISKIT 7 - Copy your disk programmes to turbo tape with ease. (C64 - disk only.)
PLUS/4 ANIMATED GRAPHICS - High-Res Animation for Plus/4 owners. (Disk only.)
SMOOTH VERTICAL SCROLLER - Professional titling for video owners. (C64)

ORDER CODE
DISK YDSEP87 £6.00
TAPE YCSEP87 £4.00

SPEEDY ASSEMBLER

Your Commodore's own assembler as used in our Byting into the 6510 series, complete with manual.

YSPASSD £9.95.

YSPASSC £9.95.

Cassettes or disks are available from March 1986. Please ring the editorial office (01-437-0626) for details of these.

ORDER FORM – PLEASE COMPLETE IN BLOCK CAPITALS

NAME	QTY	TAPE/DISK	ORDER CODE	PRICE
OCTOBER '87		TAPE (£4.00)	YC OCT 87	
OCTOBER '87		DISK (£6.00)	YD OCT 87	
OVERSEAS POST £1				
			TOTAL	

NAME..

ADDRESS..

POSTCODE..

I enclose a cheque/postal order for £...... made payable to ARGUS SPECIALIST PUBLICATIONS LTD.

All orders should be sent to: YOUR COMMODORE, READERS SERVICES, ARGUS SPECIALIST PUBLICATIONS, 9 HALL ROAD, HEMEL HEMPSTEAD, HERTS HP2 7BH.
Please allow 28 days for delivery.

Tech Troubles

If you have any technical problems, write to our agony uncle, Tim Arnot who will do his best to help.

By Tim Arnot

Dear Tim,
I have a Commodore 128 and 1571 disk drive. After what I've heard recently, just how safe is it to use the back of the disk, especially with programmes like Superbase?
Raymond North, Blackpool.

Hi Raymond,
The 1571 has certainly received its fair share of criticism over the past few months. In essence, the problem with it, is that under certain circumstances, files that use the second side of the disk can become trashed. This trashing will ONLY occur under the following specific conditions:

Either one RELative file and one SEQuential file is open or three SEQuential files are open. Of course, one of those files must be on side two!

What happens to your newly opened file on side two is basically this. After 1000 or so bytes have been written to the file, corruption of data WILL occur. The resulting file will contain only up to seven blocks of data regardless of how much was written. If you then COLLECT (validate) the disk, the block count no longer adds up to 1328.

ICPUG member Greg Perry from Australia recently provided the following program which demonstrates the problem.

PROGRAM: 1571 BUG DEMO

```
100 REM *** DEMO OF 1571 BUG ***
110 REM *** CREATE RELATIVE FILE
 TO FILL SIDE 1 ***
120 DOPEN#2,"MAIN FILE",L254:GOS
UB 420
130 PRINT "PLEASE WAIT - CREATIN
G RELATIVE FILE"
140 RN=710:GOSUB 390:REM POSITIO
N RECORD
150 PRINT#2,"END RECORD"
160 REM *** WRITE SOME RECORDS T
O FILE ***
170 FOR RN=1 TO 40
180 PRINT "WRITING RECORD #";RN
190 GOSUB 390:REM POSITION RECOR
D
200 PRINT#2,"THIS IS RECORD #";R
N
210 NEXT RN:DCLOSE
220 REM *** DEMONSTRATION OF ERR
OR ***
230 DOPEN#3,"BAD FILE SIDE 2",W
240 IF DS=63 THEN DCLOSE:SCRATCH
 "BAD*":GOSUB 420:GOTO 230
250 DOPEN#2,"MAIN FILE"
260 FOR RN=1 TO 40
270 PRINT "READING RECORD #";RN
280 GOSUB 390:REM POSITION RECOR
D
290 REM *** READ FROM REL FILE A
ND WRITE TO SEQ FILE ***
300 INPUT#2,A$:PRINTA$
310 PRINT#3,"THIS IS A COPY OF R
ECORD #";RN;"=";A$
320 NEXT RN:DCLOSE
330 REM *** NOW READ BACK THE ME
SS WE CREATED ***
340 DOPEN#2,"BAD FILE SIDE 2"
350 I=0: DO UNTIL ST<>0:I=I+1
360 INPUT#2,A$:PRINT I,A$
370 LOOP:DCLOSE:END
380 REM *** POSITION RELATIVE FI
LE ***
390 RECORD#2,(RN):GOSUB 420
400 RECORD#2,(RN)
410 REM *** CHECK DISK ERROR ***
420 IF DS<20 OR DS=50 THEN RETUR
N
430 PRINT "DISK ERROR";DS$
440 DCLOSE:END
```

Run the program on a newly formatted disk. A relative file is set up, filling all of side one and part of side two. The first 40 records are then written. To demonstrate the bug, we open a SEQuential file and copy the contents of the first 40 records into it. The resulting file is corrupt. You will see that most of the information we copied is missing. If you COPY "BADFILE SIDE 2" TO "ANOTHER", you will see something curious – the file is now only two blocks long!

This problem will occur with Superbase, and any other application that has more than one file open at once. Program loading and saving is perfectly alright, as there is only one file open. Keeping to side one is also perfectly safe.

There are new ROMs on the way, but they have been held up by the release of the new 128D. Commodore should be able to supply them 'real soon now'(!), so if in doubt, hassle them. The cost is yet to be announced.

Dear Tim,
I own an old 4032 PET and 4040 disk drive. I recently bought a Plus /4 and 1551 disk drive. My problem is this. If I save a program on the PET, I can load it on the Plus/4, but if I save it on the Plus/4, I can't load it back on the PET

Can you help me?
James McHenery, Aberdeen.

Hi James,
The reason for this is that the LOAD command behaves slightly differently on the PET compared with the later Commodore computers. On the Plus /4 (or C64, C128 etc), when you type LOAD "ANYPROG", 8 the program is loaded into memory, starting at a place known as the 'start of Basic'. This is the place where Basic programmes are stored, and it varies from machine to machine. For instance, on the PET it is \$0401, on the 64 it is \$0801, the 128 is \$1CO1, and on the Plus/4 it is \$1001.

Additionally, the 128 and Plus/4

will move the start of Basic up to $4001 if a high resolution graphics bitmap screen has been created (the $ signs indicate the addresses are in hexadecimal, or base 16).

The important thing to grasp is that these computers will always load to the start of Basic, no matter where it is The PET LOAD command is different, in that it loads to the absolute address from which the program was saved, in the case of the Plus /4, $1001. (If you enter the PET's monitor by typing SYS 4, you can see the program using the command M 1000 2000, which will display the relevant portion of memory.)

In fact, LOAD "ANYPROG"8 on the PET is exactly equivalent to LOAD "ANYPROG",8,1 on the Plus/4. In order to see a Plus/4 program on a PET, you will have to move the start of Basic up to $1001. This can be achieved by typing POKE40,1: POKE 41,16:NEW before loading the program. An alternative, if you have access to a disk monitor is to change the first two bytes of the program file to $01 04.

Dear Tim,
I am moving to America in the near future and I have a Commodore 64, and want to take it with me. Because the voltages are different, I know I will have to buy a new power pack, but is it alright to plug the 64 into a TV?
Keith Harrison, Kidderminster.

Hi Keith,
The short answer to your question is no. You are correct in saying that the mains supply is different – here we have 240 volts at 50 Hz, and in America, they have 110 volts at Hz. Thus if you try to plug your 64 in, it will not work. However, a suitable transformer could be bought out there.

The essential problem is one of TV standards. Even if you could get the 64 to function, American TV sets simply do not like the sort of signals that British TV sets thrive on. I will explain.

In Europe (except France), we use a TV standard known as PAL (Phase Alternate Line). This sends a little dot of light across the screen 625 times, each crossing slightly below the last, until it reaches the bottom. This is known as scanning, and the little dot is called a raster. Each complete scan of the picture is completed in 1/50 second. Thus, our TV sets receive 50 complete pictures in a second (actually, that is a slight simplification, but it will do).

In America, (and Russia) they use a system called NTSC (North American Television Standards Committee, or better known as Never Twice the Same Colour – if you've ever seen American sit-coms you'll know why!). This only has 525 lines in each picture, and the pictures are transmitted 60 times per second. There are also other differences to do with things like phase, but that gets complicated.

Thus, your 64 puts out 625 line PAL and your TV will want 525 line NTSC, and ne'er the twain shall meet. Of course it is possible to convert one to the other, but on a conservative estimate, a box to do that will cost something over ten grand. Sell your 64 and buy another out there. It's cheaper and much less hassle!

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:
[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]
This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:
[SS],[C*]
In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:
:CC=2*[PI]*R:
Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

PROGRAM: SYNTAX CHECKER

```
5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10   :LN=70   :SA=49152
20 FOR L=0 TO BL:CX=0:FOR D=0 TO
 15
30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
40 CX=CX+A:POKE SA+L*16+D,A:NEXT
 D
50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
60 NEXT L:SYS 49152:NEW
70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing! YC

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & f1 key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

YOUR COMMODORE

Lineage: 54p per word. (including VAT)
Semi display: £11.73 per single column centimetre (including VAT) minimum 2cm. Ring for information on series bookings/discounts.

All advertisements in this section must be prepaid.
Advertisements are accepted subject to the terms and conditions printed on the advertisement rate card (available on request).

01-437 0699

Send your requirements to:
JON WATSON
ASP LTD, 1 GOLDEN SQUARE, LONDON W1

SPECIAL OFFERS

SPECIAL OFFER

Commodore Plus 4, 64K computer, disk drive, tape recorder, built in business software and games:

** only **
Pack Price **£99.95**

with monitor **£149.90**
with MPS801 printer **£249.90**



THE COMPUTER DEPOT
205 Buchanan Street, Glasgow, G1 2JZ
041-332 3944
ACCESS

SOFTWARE

TORNADO 64 (Tape to Tape Back-up)
Available for the Commodore 64 and 128 (64 mode) - Tape version only **£4.95p**
BETPRO II (Horse race rating Program)
Available for the Commodore 16, Plus/4, CBM 64 & 128 - Tape **£9.95** Disk **£11.95**

ABACUS SOFTWARE FROM RAMSOFT (DISK ONLY)

Cadpak C-64	£24.95	Cadpak C-128	£34.95
COBOL C-64	£24.95	COBOL C-128	£34.95
Chartpak 64	£24.95	Chartpak 128	£39.95
Super C 64	£44.95	Super C 128	£44.95
Video Basic	£24.95	Super Pascal	£44.95

WE NOW STOCK A SUPERB RANGE OF UTILITIES/APPLICATIO PROGRAMS/BOOKS FOR THE COMMODORE 16, PLUS/4, CBM 64 & 128 FROM COMPANIES LIKE SUPERSOFT, ABACUS, ETC. SEND FOR FREE CATALOGUE, STATING WHICH COMPUTER(S) YOU HAVE.
Access orders Only (Not Visa) now accepted TELE 0706 43519 after 1pm please.
All prices quoted include P&P in U.K., otherwise add £2.
Send Cheque/P.O. to: **RAMSOFT (DEPT YC2), 24 Bankfield Lane, Norden, Rochdale, Lancashire, Ol11 5RJ.**

MAKE YOUR COMMODORE EARN!

Yes, making money becomes incidental when you know how. Your Micro is, if only you knew it, a gold mine, the size & make is IRRELEVANT. Make the initial effort NOW by starting your own HOME BASED BUSINESS. Remember you'll never get rich digging someone else's "Ditch". It's more rewarding than playing games. The benefits are many and varied. Full or part-time, for FREE Details S.A.E. to:
HOME BASED BUSINESS
97 Pilton Place (YC13), King and Queen St
Walworth, London SE17 1DR.

GAMES

TEST/DEVELOP YOUR MENTAL SKILLS
MIND EXPANDERS
Improve your powers of deduction with **REAL BATTLESHIPS**
Try your skill as an organiser in the **HANOI PANIC**
Test your concentration around the **INVISIBLE MAZE**

Tape £3.45 SENIOR GAMES
Disk £3.95 12 St. Bartholomews
EACH Close, Kettering
C.W.O. Northants NN15 5EF

01 437 0626

DISCOUNT SOFTWARE: Latest titles for CBM64/128 at 50% off R.R.P.; S.A.E. To: A.O.W. 104 Hollywell Road, Lincoln, LN5 9BY.

RESULTS = 01 437 0699

TERMS & CONDITIONS

CLASSIFIED ADVERTISING TERMS & CONDITIONS

Our terms for new advertisers (semi-display and lineage) are strictly pro-forma payments until satisfactory reference can be taken up (excluding recognised advertising agencies). Cheques and P.O.'s should be crossed and made payable to ARGUS SPECIALIST PUBLICATIONS LTD. and sent together with the advertisement to:

"The Classified Dept., No. 1 Golden Square, London W1R 3AB.

There are no reimbursements for cancellations. Advertisements arriving too late for a particular issue will be inserted in the following issue unless accompanied by instructions to the contrary. It is the responsibility of the advertiser to ensure that the first insertion of every series is published correctly, and corrections must be notified in time for the second insertion, otherwise the publishers will not accept any liability or offer any reduction in charges.

All advertising sales are subject to Government Regulations concerning VAT. Advertisers are responsible for complying with the various legal requirements in force eg: The Trade Description Act, sex discrimination act & the business advertisements (disclosure) order 1977.

Full Terms & Conditions of Advertising available on request.

PRINTER SERVICES

ALADDINK

FABRIC RIBBON CASSETTE RE-INKING
Trial Offer: £1 per ribbon
Post used cassette(s) with payment to: ALADDINK (Dept CM), 4 Hurkur Crescent, Eyemouth, Berwickshire, TD14 5AP
Tel: 08907 50965

FOR SALE

TRIANGLE TELEVISION
The Amiga Specialists

- FOR ALL YOUR VIDEO AND AUDIO VISUAL REQUIREMENTS
- A500 AND A2000
- FULL RANGE OF PERIPHERALS
- FULL RANGE OF SOFTWARE
- RGB CONVERTERS
- TRAINING COURSES

TRIANGLE TELEVISION
130 Brookwood Rd.,
London SW18 5DD Tel:01-874 3418

SERVICES

CBM64: TIRED WITH GAMES? Want to do more? Learn to backup protected software, copy-protect you own, print Hires screens, etc. Send SAE plus two 13p stamps to: 17 Plover Road, Milborne Port, Sherborne DT9 5DA.

ADVERTISE YOUR BUSINESS IN YOUR COMMODORE

NEXT COPY DEADLINE DECEMBER ISSUE: 29th September

WARNING NOTICE

Advertisements placed in this magazine are to be in strict compliance with our standard conditions (copies of which conditions are available on request) and on the clear understanding that the advertiser warrants that his advertisement(s) does not infringe any copyright or condition of sale of any interested party in the advertised product.

Further, the advertiser indemnifies the proprietors of this magazine in respect of costs, damages, or any other claims brought against them as a result of legal action arising from the publication of the advertisement.

Any breach of these terms or the said conditions may result in prosecution of the advertiser by the proprietors.

B H E A K

C16 Sprite

There are no problems with this program as printed. A number of people have queried how they should enter the [255] statements that appear in some of the lines of the DEMO program. When our printer can't reproduce a Commodore graphic, either a mnemonic such as [LEFT] is printed or the code of the character is printed within square brackets. In this case the character should be looked up in your manual and entered. In the case of the [255] the character that should be entered is the PI figure (π).

Software for Sale Important Notice

A number of people have reported an error when LOADing drawings that have been SAVEd using the TEC DRAW 64 program.

It appears that a master copy became corrupted and has caused these problems.

Should your copy of the program suffer from this problem please return your disk to:

OMEGA MICRO SERVICES
7 GRAHAM AVENUE
BRINSWORTH
ROTHERHAM
S60 5LA.

and a new disk will be sent by return post. Sorry for any inconvenience caused.

Apologies are also due to people who experienced delays with software ordered in late June/early July. Unfortunately, problems were caused by problems with the postal service within London.

Fist

Are you a winner in the Exploding Fist competition from April 1987? Read on and find out.

Craig Smith, Faringdon; John Trower, Horsham; Michael Hall, Basingstoke; Richard Garfield, Rochdale; James Laidlaw, Lincoln; Perry Green, Ealing; Iftkhar Din, Nottingham; Mark Jaycocks, Herne Bay; Mark Woodhouse, Nottingham; Eric Neill, Ballykelly; Mark Kay, Leicester; Mark Eades, Bingley; Ian Ashworth, Chorley; Neil A. Sarbutt, Basingstoke; Leanne Piper, Hull; G. W. Jesshop, London; The Jolly Bodger, Edinburgh; Paul Kennings, Birmingham; Keith Lewis, Bromley; Daniel Austen, Anglesey; R. Jones, Barnsley; Jason Main, South Shields; Wayne Dribben, Upminster; Mark Cornwall, Milton Keynes; Thomas Branton, Thamesmead; W. R. Austin, Plymouth; John Sims, Edmonton; M. Elswood, Crewkerne; Anthony Roberts, London; Patrick Putnam, Chingford; P. Aland, Bristol; B. Wadher, Thornton Heath; Bao Minh Nhan, Scarborough; Chris Garbutt, Basildon; M. Forrest, Watford; J. Heathcote, Warrington; C. Hawkins, Bracknell; G. Higgins, Stevenage; Perry Green, Ealing; Richard Wallis, Canterbury; Michael Williams, Caernarfon; John Campbell, Guernsey; David Marin, Salford; K. Kelsall, Stevenage; Pia Dalsfeldt, Denmark; Junior Hall, Nottingham; Brian Nicholls, Stoke-On-Trent; Kevin Scarfe, Bordon; T. Dutton, Biggin Hill; Louise Wells, Isleworth.

Bug Finder

We'd like to remind our readers that we run a Bug Finder service.

If you have typed in one of our programmes and despite much checking, you still can't get it to run, then send us the following:

Two copies of your program on tape or disk.
A description of your problem.
If possible a listing of your work (you may omit this).
A stamped, self addressed envelope for return of the program to you.

Should any of the above be missing then we will not be able to deal with your query.

We will try to point out where you have made errors and place a corrected copy of the program back on to your tape or disk before we return it to you.

Do not send a program to us as soon as it stops working, please check it several times first.

We do get a large number of queries and so it may take a while for us to deal with yours personally.

Note:we can only deal with problems relating to programmes published in *Your Commodore.*

ARGUS PRESS GROUP

Editor: Stuart Cooke
Assistant Editor: Sue Joyce
Editorial Assitant: Kirk Rutter
Senior Advertising Manager: Pete Chandler
Advertisement Manager: Stuart Taylor
Advertisement Copy Control: Laura Champion
Origination: Ebony Typesetting
Design: Argus Design

Your Commodore incorporating Your 64 is a monthly magazine appearing on the first Friday of each month.

Argus Specialist Publications Limited Editorial & Advertisement Office, Your Commodore, No 1 Golden Square, London W1R 3AB. Telephone: 01-437 0626 Telex: 8811896.

Subscription rates upon application to Your Commodore Subscriptions Department, Infonet Ltd, 5 River Park Estate, Berkhamsted, Herts, HP4 1HL.

Distribution by: Argus Press Sales & Distribution Ltd. 12-18 Paul Street, London EC2A 4JS. Printed by Chase Web, Plymouth.

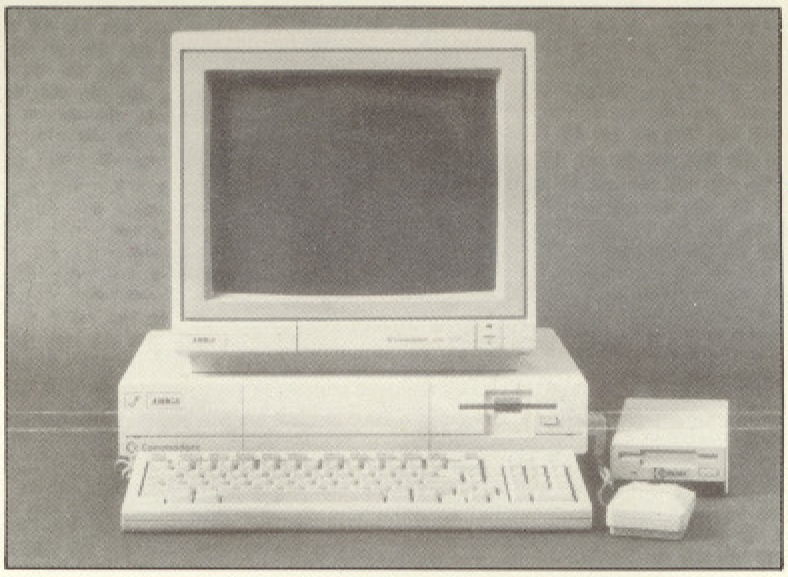
ISSN 0269-8277

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

AT LAST!

AN ECONOMICAL ALTERNATIVE TO THE BULKY EXTERNAL AMIGA DISK DRIVES

3.5" EXTERNAL FLOPPY DISK DRIVE FOR THE COMMODORE AMIGA



SPECIAL OFFER £139.00 inc.!

CUMANA CAX 354

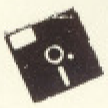
Amiga owners can now easily upgrade to twin floppy operation with the purchase of Cumana's high quality external 3.5 inch floppy drive. The Cumana CAX 354 conveniently takes its power from the host computer and offers a full 880K of formatted storage to either A500 owners or users of system 1 and 3 A1000 series -

- High quality NEC 3.5 inch double sided drive mechanism
- 1Mb Unformatted storage capacity
- High Reliability
- Fast Access
- Quiet operation
- Lower power consumption
- Connector enables easy addition of 5.25" drives

SPECIFICATIONS

Seek time (track to track) 3ms • Settling time 15ms • Rotational Speed 300 RPM • Data Transfer Rate 125/250 Kb per sec • Number of tracks 80 • Number of sides 2

FED UP WITH PAYING HIGH PRICES FOR YOUR 5-25" FLOPPY DISKS??? JUST LOOK AT OUR PRICES!!!!



DS/DD 5.25" DISKS
AT THE SILLY
PRICE OF JUST **£6.00** PER TEN
SAVE EVEN MORE MONEY
BUY TWO PACKS AND SAVE
ANOTHER **£2.00**

TWO PACKS OF TEN 5.25" DISKS JUST £10.00

Complete with labels and write protect tabs.
Prices include VAT and UK P&P.
No fancy boxes to throw away. You get the highest quality disk at the lowest of prices.

DISK NIBBLER

Use both sides of your disks. Save the cost of the Nibbler with just one box of disks even at our prices. Only **£5.00** or **FREE** if you buy 50 or more 5.25" disks.

SPECIAL OFFER

50 5.25" disks	£25.00
1 DB5/100 disk box	£10.50
Disk Nibbler	F.O.C.
OUR NORMAL PRICE	£46.50
OFFER PRICE	£35.00
SAVE !!!!!	£11.50

Prices include VAT and UK postage

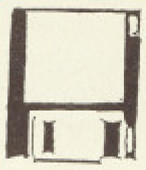
COMMODORE CABLES

CPC/1 CENTRONICS PRINTER CABLE
Commodore C64/128 user port to centronics printer cable. The cable is fitted with a line feed switch for the Epson range of printers. Works with all well known centronics printers. **ONLY £15.00** incl.

CPC/2 SERIAL EXTENSION CABLES
Extend your commodore printer or disk drive cable by up to 2 metres
1 Metre extension cable........ **£5.00** incl
2 Metre extension cable........ **£7.00** incl

CPC/3 128D KEYBOARD EXTENSION
Do you find yourself restricted by the short keyboard cable on the C128D. Solve your problem with our 1 metre extension cable.
We have mounted our C128 under the desk to save room.
SPECIAL OFFER PRICE ONLY £15.00 incl

AT LAST!!!! 3.5" DISKS AT SENSIBLE PRICES



Double sided, double density 3.5" verbatim disks
ONLY £16.00 for pack of ten disks
SAVE EVEN MORE MONEY!!!!
BUY TWO PACKS FOR ONLY £30.00
These are not cheap disks but best quality disks at low prices.

NASHA DS/DD 3.5" DISKS
BOXED, WITH LABEL
OUR LOW PRICE **£23.00** per box ten.
SAVE EVEN MORE MONEY!!!
BUY TWO BOXES FOR ONLY **£44.00**

We believe our prices are the lowest you will find.
All prices include VAT and UK postage.

LOCKABLE DISK BOXES

DB3/90
3.5" disk box holds 90 disks first class value at only **£12.50** or only **£11.50** when you buy 10 or more 3.5" disks.

DB5/70
5.25" disk box hold 70 disks great value only **£9.50** or only **£8.50** when you buy 20 or more 5.25" disks.

DB5/100
5.25" disk box holds 100 disks bargain at only **£11.50** or only **£10.50** when you but 20 or more 5.25" disks.

NEW! NEW! NEW! NEW! NEW!

COMMODORE C64, C128 RS232 INTERFACE

AT LAST!! RS232 Interface that will not cost you the earth.
The H&P Computers Commodore RS232 Interface is a full industrial standard RS232 Interface with all handshakeing lines, that plugs into the user port.
Will fit all modems and printers with a 25 way D connector.
Up till now you would have had to pay between **£35.00** and **£50.00** for a RS232 Interface for the C64/C128.
The H&P Computers RS232 is only **£25.00 incl.** and we even give you an xmodem comms program on disk **free of charge.**

ONCE AGAIN WE BRING THE BEST FOR LESS.
ONLY £25.00 INCL.

H&P COMPUTERS UK,

9 HORNBEAM WALK, WITHAM, ESSEX CM8 2SZ. Tel: (0376) 511471

You won't find these programs in the top ten!



These programs have sold thousands of copies, and yet you won't have seen them in the charts — why?

We produce programs that you can really get your teeth into. Programs like **BUSICALC** and **BUSICALC 3** which can be used at home or in the office to do all sorts of calculations, forecasts and budgets.

Programs like **MIKRO ASSEMBLER** and the **ZOOM** monitor which make it easy to write machine code programs. Programs like **MUSIC MASTER** which turn your computer into a musical instrument. And programs like the **BLITZ** compiler which makes ordinary BASIC programs run much, much faster.

We have been writing programs for Commodore computers since 1978 and now have hundreds of programs for the PET, VIC 20, CBM 64, CBM 128, even the C16 and Plus/4. So why aren't our programs in the charts?

Because our programs aren't one minute wonders, here today and gone tomorrow. Programs we released for the 64 in 1983 are still selling — and even more important, the people who bought them then are still using them.

Software should be an investment, not money down the drain. We believe that the more you put into a program, the more you should get out of it, and that's the way it works with software from **SUPERSOFT.**

The programs listed on the right represent a small selection from our range, but you can get a full list if you phone or write to the address below. We offer an excellent mail order service, and you can pay by cheque, Access, or Visa.

SUPERSOFT, Winchester House,
Canning Road, Wealdstone, Harrow,
Middlesex HA3 7SJ
Telephone: 01-861 1166

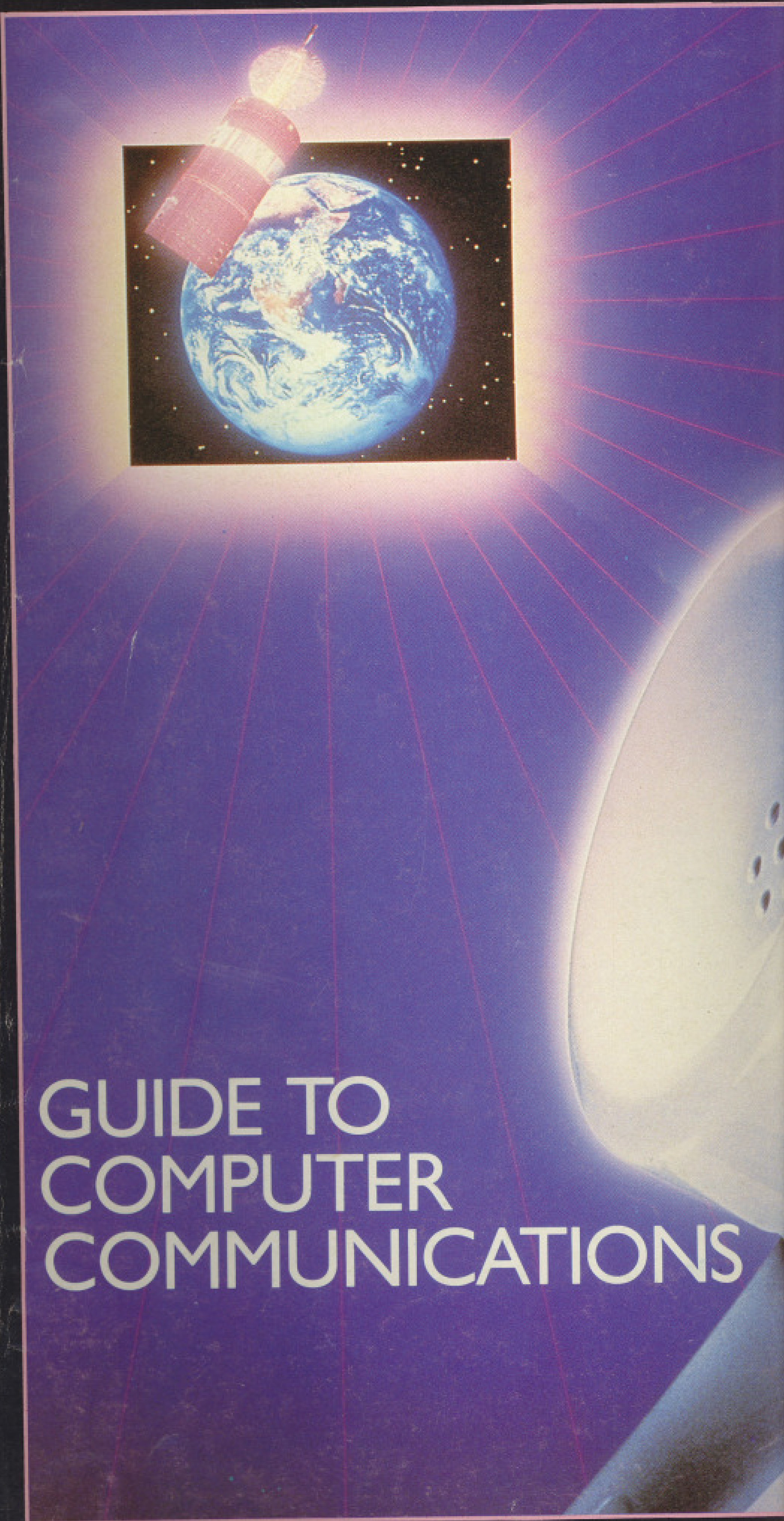
SUPERSOFT

For Commodore 64	
Busicalc	17.95t 19.95d
Mikro Assembler	57.70c
Turbo Disk	14.95d
Pass Your Driving Test	8.95t
Music Master	17.95t 19.95d
Interdictor Pilot	17.95t 19.95d
Blitz Compiler	14.95t 19.95d
Word Perfect	17.95t 19.95d
Instant Recall	17.95t 19.95d
For Commodore 128	
Blitz Compiler	29.95d
128 Plus upgrade rom	19.95r
Help 64/128 cartridge	39.95c
For C16 and Plus/4	
Turbo 16	6.95t
Graphics Designer	6.95t 8.95d
Mikro Assembler	12.95t 14.95d
Music Master	12.95t 14.95d
Word Perfect	12.95t 14.95d
For Commodore Pet	
Word Perfect	51.75r
Flex-File 2.1	97.75d
Busicalc	44.85t 47.15d
Busicalc 3	97.95d
For Commodore Amiga	
MIDI for Amiga	49.75

YOUR
COMMO...
AN ARGUS SPECIALIST PUBLICATION

YOUR COMMODORE OCTOBER 1987

VOL 4 No. 1



GUIDE TO COMPUTER COMMUNICATIONS

● BOTHERSOME BASIC – BEGINNERS ST...
SUPERB C16, PLUS/4 GAME ● ADVENTU...